Article

Application of Revised Importance–Performance Analysis to Investigate Critical Service Quality of Hotel Online Booking

Rong-Chang Jou and Yeong-Jia Day

Abstract: This study integrates the three-factor theory and Importance–Performance Analysis (IPA) into a three-dimensional importance–performance analysis (3-D IPA) approach to identify the critical service quality attributes for hotel online booking. A seven-point Likert-type scale of service quality measurement was designed in the survey and the participants (foreign independent tourists) were randomly selected at Taoyuan International Airport, Taiwan. A total of 453 participants were identified. The classification of the factors was based on the explicit importance, while the implicit importance was measured with the relationship of satisfaction by using the ordered probit model. The results, compared to the traditional method of partial correlation analysis, were different in the dimensions of Fulfillment and Responsiveness, Safety and Security, Website Functionality, and Customer Relationships. In conclusion, this study broadens the perspective of research method and improves the performance evaluation of e-service quality attributes. The empirical results provide recommendations and policy implications for resource allocation of hotel management.

Keywords: online shopping; three-dimensional importance–performance analysis; service quality

1. Introduction

The 1990s witnessed the rise of the Internet, resulting in the growth of online trends and the emergence of the e-commerce industry. The 2000s burst of the dot-com bubble reduced interest in the Internet craze, yet, during this time, the number of Internet users gradually increased. The rapid spread of the Internet and the dissemination of information have changed the spending habits of many consumers, who went from shopping in physical stores to making online purchases. The Market Intelligence and Consulting Institute (MIC) conducted a survey of online purchase behaviors. The results indicated that, in 2013, Taiwan’s Internet users spent an average of approximately 17,427 yuan per annum online (https://mic.iii.org.tw/micnew/Industryobservation_MIC02views.aspx?sqno=90 (accessed on 14 February 2021)). The intangibility of tourism products has increased the risks of tourism-related spending. Online marketing could utilize articles, photographs, and videos to reify tourism products, thereby reducing their perceived risk of purchase and promoting consumer decision making [1]. As an increasing number of tourists are looking for travel information and making travel arrangements online, e-commerce has become an important sales channel for tourism. Furthermore, the concept of Web 2.0 has transformed formerly business-oriented websites for service delivery into user-driven content-sharing platforms. Consumers now interact with even more consumers to exchange information and share experiences. Thus, perceived risks and electronic word-of-mouth are key factors for influencing consumer decision making for online purchases [1].

Traveler satisfaction is highly relevant to customer loyalty and the sustainable development of a hotel. With increasing expectations to implement environmental practices, it is important for hoteliers to show their involvement with the environment [2], that is,
recycling, the use of solar energy, a sustainable water supply system, a low-flow shower or toilet, organic restaurant or food, etc. Sustainable tourism also represents a more authentic and local travel experience and will provide a higher feeling of place attachment [3]. The advance of 5G communication technologies have led to mobile commerce and related applications to experience rapid growth [4] and many transactions are conducted online. The research of Chen et al. [5] indicated that corporate credibility, service convenience, technology contradiction, and technology insecurity influenced the consumers’ use intention in ticketing Apps. Nowadays, most hotel bookings are now made online through booking websites or specified Apps. Moreover, customer security in the e-commerce sector, which concerns more than 2 billion people worldwide and over 20 million shopping sites, should be approached in terms of sustainability, because it is a global social issue [6].

Most of the research on online travel service quality has focused on travel products and the quality of online services [7] or on online service quality and the relationships among different facets [8–10]. Some studies have examined the quality in different online services (e.g., online travel reservations, accommodation reservations, and online ticketing; [11]). Others studies have compared the different attributes of online tourism information sources [12]. Assessments have also been conducted from an expert perspective on the electronic service quality of online travel agency websites [13] and on the recovery of satisfaction [14]. However, none of these studies have examined whether the design of online accommodation reservation systems is consistent with the needs and expectations of customers. The allocation of business resources has also not been explored. To fill this research gap, this study combined the three-factor theory of the extended Kano model with an importance–performance analysis to conduct an empirical study on the quality of online accommodation reservation services. Many studies have changed the complex two-dimensional characteristics of the Kano model into multiple regression analyses and partial correlation coefficients [15–21] for data analysis in order to simplify the complexity of the surveys. Accordingly, considering the given survey data format, this paper proposed the ordered probit model approach to replace the multiple regression analysis, which may be subject to multicollinearity.

Thus, this study attempted to apply an ordered probit model to indirectly measure “implicit importance.” Actual performance, explicit importance, and implicit importance were categorized through a three-dimensional importance–performance analysis (3-D-IPA) method using an IPA approach and three-factor theory. The results of this study’s exploration of the quality-of-service attributes could be used as an important reference by which online booking companies could develop future business strategies, introduce products and services, design website features, improve customer satisfaction, and strengthen competitiveness. The purpose of this study is to identify online hotel booking service quality by applying the ordered probit model approach as an innovative implicit importance conversion mechanism. The result of a resource allocation strategy is compared with the traditional method, where a partial correlation analysis is used. Strategic actions are developed and recommended for business leaders.

2. Literature Review
2.1. E-Commerce, M-Commerce, and Tourism

In 2008, Japan Rakuten Ichiba established a joint venture with Taiwan’s President Chain Store to form Taiwan Rakuten Ichiba Inc., a Business to Business to Consumer (B2B2C) e-commerce platform. Ezprice [22] reported that the top five Taiwan online retailers are Pchome 24H online shopping, GoHappy online shopping, Momo online shopping, Yahoo shopping, and UDN shopping. The top three most-frequently visited sales channels by online users are convenience stores, discount stores, and supermarkets. Auction sites and shopping sites are ranked fourth and fifth, respectively. These are now ahead of traditional channels, such as department stores, DIY stores, and boutiques. According to MIC statistics, Taiwan’s e-commerce market reached $243 billion New Taiwan Dollars in
2008, representing a growth of 36.4% since 2007. Online shopping accounted for almost half of the overall e-commerce value.

The 2015 Taiwan Broadband Internet Usage Survey conducted by the Taiwan Network Information Centre [23] showed that approximately 17.57 million Taiwan Internet users (83.7%) were over 12 years old in 2015, an increase of 6.0% since 2014. Internet usage among those under 12 was 51.2%, or approximately 1.26 million users. The total number of Internet users amounted to 18.83 million. Historical surveys indicate year-over-year growth in the number and proportion of online users aged 12 and older (see Figure 1). In 2019, 88.8% of Internet users used wireless Internet access (including mobile and WiFi Internet access). The most common way for respondents to connect to the Internet is through a “Mobile Telecommunications Network” (referring to the use of portable Internet devices, such as smartphones, tablets, etc., to connect to the Internet via Mobile Telecommunications Networks), i.e., up to 70.2% [24]. This provides a great opportunity for the development of Mobile commerce (M-commerce). M-commerce means buying and selling exchange goods and services through wireless handheld devices such as mobile smartphones and tablets. With specific applications (Apps), a mobile device can be used to conduct online purchases [25–27].

The online shopping experience is heavily influenced by factors such as previous purchase experience, perceived service quality, prices, risks, network comments, and recommendations [1]; thus, most travel agencies and hospitality industries are investing in the development of online services in order to solidify the existing consumer base and actively promote product purchases from potential website visitors. The emergence of Web 2.0 has also increased the impact of user interactions and the sharing of experiences. According to Vlachos [28], approximately 87% of tourists would use Internet resources to plan itineraries, 16% would share their travel experiences, 43% would read others’ experiences, and 11% would interact with other travelers and exchange information. Thus, when choosing a tourism product, eWOM (electronic word-of-mouth) plays a key role in consumers’ perceptions of trust and decision making [29]. eWOM was also regarded as the proxy of consumer loyalty [30]. Martínez-González and Álvarez-Albelo [31] identified the influence of site personalization, first impression, and design on young consumers’ loyalty to tourism websites.

Many researchers have studied the effectiveness of e-commerce application [32–37]. The research efforts for online service quality have focused on the biggest difference between online service and traditional service, e.g., the interaction between consumers and
websites and the emphasis on website design and technical quality. Zeithaml, Parasuraman and Malhotra (2002) [38] showed the impact of network service on corporate competitiveness, where providing high-quality service via the Internet was more competitive than low price provision. Parasuraman, Zeithaml and Malhotra [39] further considered the difference between network service and traditional face-to-face service, which relies on network technology and consumer recognition of the service, and put forward the assessing factors for online service quality. Based on this architecture, many researchers have developed applications for assessing factors for online service quality in various fields [40–46].

Given their convenience and efficiency, online accommodation reservation services have become the primary method travelers use to book their accommodations [1,47–50]. As the popularity of Internet usage grows in this highly competitive industry, improvements in tourism services and in the quality of online services have become a key business focus for travel industries. In this ever-changing world of online content, websites with basic purchase functionalities no longer grab the attention of consumers. Online booking websites need to value customers’ trust, as perceived trust can reduce levels of perceived risk. It is also a key indicator of the consumer’s purchase intention [1]. Sparks and Browning [29] found that eWOM had a significant impact on consumers’ accommodation reservation choices and decision-making process. The more positive the consumer’s evaluation, the more it promotes the consumer’s perceived trust and facilitates online booking behavior [51].

Many studies have explored various facets of the quality of online accommodation booking services. For example, using SERVQUAL model, Kaynama and Black [52] proposed seven facets—content, accessibility, navigation, design/presentation, responsiveness/feedback, background information, and personalization/customization—to use as measurement standards for the quality of service provided by online travel agencies. Liu and Zhang [53] divided the travel website service quality into two parts: product-related factors and channel-related factors; the former describing product price, product review, and product variety, and the latter comprising website quality (information quality, service quality, and trust/privacy), payment, and customer relationship (previous experience, loyalty program, marketing, and popularity). These facets were employed to compare the service quality of websites for hotels and online travel agencies.

2.2. Two-Dimensional Quality Model

2.2.1. Kano Model and Three-Factor Theory

In the one-dimensional model, customers were satisfied when they felt the quality elements were adequate. In the two-dimensional quality model, however, customers might not be satisfied, even though they feel the quality elements were adequate. The elements may result in dissatisfaction or have no impact. On the basis of the Herzberg (1959) motivation-hygiene factor theory, Kano et al. [54] proposed Kano’s two-dimension quality model, which divides quality elements into five categories: attractive quality, one-dimensional quality, must-be quality, indifferent quality, and reverse-quality (Figure 2).

Brandt [55] later proposed a three-factor theory that divided service elements into three types: (1) the minimum requirement, (2) value-enhancing features, and (3) hybrid attributes. These were tested and applied in a number of studies. Matzler and Sauerwein [56] and Matzler et al. [57] divided quality attributes into basic factors, excitement factors, and performance factors. (1) Basic factors: when these are in place, customers consider it as a standard, and their satisfaction level does not increase. In their absence, customers are dissatisfied. The definition of this category is consistent with the “must-be quality element” of Kano’s two-dimensional quality model. (2) Excitement factors: if these are sufficient, customer satisfaction is enhanced. If they are insufficient, customers are dissatisfied. The definition of this factor is consistent with the “attractive quality element” of Kano’s two-dimensional quality model. (3) Performance factors: if these are perceived to be high, customers are satisfied. Inversely, if they are perceived as low, dissatisfaction results.
Hence, the definition of this factor is consistent with the “one-dimension quality element” of Kano’s two-dimensional quality model.

![Figure 2. Kano’s model. Source: Kano et al. [54].](image)

The definitions of the three factors suggest that the perceived quality attributes of the basic factors and excitement factors form a nonlinear asymmetric relationship with overall customer satisfaction. In terms of performance factors, the perceived quality attributes form a linear and symmetric relationship with overall customer satisfaction. Therefore, if the customer’s evaluation of the perceived basic factors was low, the customer will consider this factor important. If the evaluation is high, the customer will consider the factor unimportant. Conversely, if the customer’s evaluation of the perceived excitement factors is high, the customer will consider this factor important. If the evaluation is low, the customer will consider this factor unimportant [57].

2.2.2. The Measurement of Kano Model and Three-Factor Theory

Kano’s two-dimensional quality model is a survey method that uses paired positively and negatively worded questions to evaluate customers’ perception about when a quality attribute is sufficient or insufficient. To simplify Kano’s two-dimensional quality classification system, some studies have applied a two-factor approach to distinguish between the impacts of sufficient and insufficient service quality attributes on overall customer satisfaction. Many approaches (e.g., [56,57]) modified the traditional Kano-style survey method to a multiple regression analysis to complete the three-factor classification for service quality. However, multicollinearity might impact the accuracy of multiple regression analysis. Therefore, a later study proposed a partial correlation analysis to complete the three-factor classification of service quality attributes [18]. Since the data that we collected are in ordinal scale, the ordered probit model is also applied to compare with the results obtained from partial correlation analyses.

2.3. Importance–Performance Analysis

The IPA framework was proposed by Martilla and James [58], who evaluated the performance of the automotive industry from the customer’s perspective. The relative positions of the evaluated attributes are outlined below (Figure 3): (1) Keep Up the Good Work—these attributes are likely to be the main source of competitiveness and attractiveness for the business. Therefore, the business should maintain these attributes; (2) Possible Overkill—the enterprise may have overinvested in this attribute. Thus, the business should consider reallocating some resources to other attributes in order to improve overall perfor-
2.3. Importance–Performance Analysis

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This study used a questionnaire survey method to gather responses from respondents. The questionnaire was divided into three major sections. The first asked respondents about their experience of online accommodation reservation services, including the overseas destination of the trip, the website used, the number of reservations made, and the payment method used. The second section divided the quality of online accommodation reservation services into five major facets: Website functionality, Fulfilment and Responsiveness, Customer Relationships, Information Content and Quality, and Safety and Security. A seven-point Likert scale was used to measure the importance of these facets (1 = “very unimportant”; 7 = “very important”) as well as their satisfaction (1 = “very dissatisfied”; 7 = “very satisfied”). The e-service quality questions and their sources are enumerated in Appendix A. The last section contained personal information such as gender, age, education, income, length of Internet usage experience (in years), and daily Internet usage rate.

Figure 3. Importance–performance analysis grid (source: Martilla & James [58]).

3. Research Methods

3.1. Questionnaire Design

The survey questionnaire used in this study was based on the e-travel service quality scale developed by Ho and Lee [59], who applied five facets—information quality, security, website functionality, customer relationships, and responsiveness—to evaluate the e-travel service quality. The “information quality” refers to the online information provided by the businesses and whether the service methods and contents met the customers’ needs. The “security” aspect focuses on the customers’ trust in the website service provider and the security of personal data and transactions. The “website functionality” aspect concerned website features in terms of search functionality, website resource access, and transaction mechanism; this feature could also be considered ease of use. The “customer relationships” facet concerns the customer relationship management strategy adopted by the website. The “responsiveness” aspect concerns the responsiveness of the website providers to customer issues and questions; this definition is consistent with the definition of “responsiveness” outlined in SERVQUAL. This study also referred to the service quality attributes and facets outlined in related studies, such as Tsang et al. [7], Hsu et al. [13], Llach et al. [10], Kaynama and Black [52], and Wolfinbarger and Gilly [60]. The facets were consolidated and amended and then developed into questions for the purpose of this study.

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3.2. Pre-Test and Sampling Data

The first draft of the questionnaire was tested for content validity in terms of its questions and semantics by three experts. Then, the questionnaire was issued to 30 test respondents for responses and interviews. A small part of the survey language was amended based on the feedback. The amended survey became the official questionnaire. This survey was formally rolled out from 1 June to 8 July 2017. The survey was run from 9:30 to 19:30 every day at Taiwan Taoyuan International Airport Immigration Hall and departure gates. The survey targets were individual international travelers who had used online accommodation reservation services. Given passengers’ travel schedules and their variable willingness to participate, a simple random sample of travelers was chosen to complete the survey.

3.3. Data Analysis

An ordered probit model was used to construct an analytical model for the overall satisfaction of online users regarding the quality of online accommodation booking services. The study also explored the relationship among various factors and their overall satisfaction. Behavioral research must often deal with ordinal dependent variables, which are related in sequence or scale. The general multinomial probit model, however, cannot explain their relevant orders. Linear regression analysis would be unable to explain the strength of information represented by the variables among all the levels.

The ordered probit model is as follows:

\[ y^*_i = x_i \beta + \epsilon_i, \epsilon_i \sim N(0, 1), \forall i = 1, \ldots, N \]  

(1)

where \( y^*_i \) is the dependent variable, the overall satisfaction observed in this study, \( x_i \) represents the service quality attributes impacting overall satisfaction, \( \beta \) is the value of variable coefficients, and \( \epsilon \) represents the error term with normal distribution \( \epsilon \sim N(0, 1) \).

In the satisfaction analysis model, \( y^* \) represents the degree of satisfaction that users felt towards the overall service quality; the higher the value, the higher the degree of satisfaction. As \( y^* \) is a continuous variable that could not be observed, \( y \) is defined as the observed corresponding value of \( y^* \). For Equation (2), we assume that \( j = 0, \ldots, m \); the threshold parameter \( \mu_j \) is applied to distinguish the corresponding area of \( y^* \). In this study, the dependent variable is coded as 0, 1, 2, 3, 4, 5, 6, and is defined as Equation (3):

\[
\begin{align*}
    y_i &= j, \mu_{j-1} < y^*_i \leq \mu_j \\
    y &= \begin{cases} 
    0, & \mu_{-1} < y^*_i \leq \mu_0 \\
    1, & \mu_0 < y^*_i \leq \mu_1 \\
    2, & \mu_1 < y^*_i \leq \mu_2 \\
    3, & \mu_2 < y^*_i \leq \mu_3 \\
    4, & \mu_3 < y^*_i \leq \mu_4 \\
    5, & \mu_4 < y^*_i \leq \mu_5 \\
    6, & \mu_5 < y^*_i \leq \mu_6 
    \end{cases}
\end{align*}
\]

(3)

When \( \mu \) is assumed to be the expected value equal to 0, the standard error value \( \epsilon \) is assumed to have a normal distribution. Thus, the probability of user \( i \) selecting category \( j \) could be deduced as:

\[
P(y_i = 0) = P[\mu_{-1} < y^*_i \leq \mu_0] = P[\infty < y^*_i \leq \mu_0] = P[y^*_i \leq \mu_0]
\]

(4)
Substituting with Equation (1), the Cumulative Probability Density Functions are as follows:

\[
P(y_i = 0) = P[x_i \beta + \epsilon_i \leq \mu_0] = P[\epsilon_i \leq \mu_0 - x_i \beta] = \leq (\mu_0 - x_i \beta)
\]

\[
P(y_i = 1) = P[\mu_0 < y_i \leq \mu_1] = P[\mu_0 < x_i \beta + \epsilon_i \leq \mu_1] = P[\mu_0 - x_i \beta < \epsilon_i \leq \mu_1 - x_i \beta] = \leq (\mu_1 - x_i \beta) - \leq (\mu_0 - x_i \beta)
\]

\[
P(y_i = 2) = \leq (\mu_2 - x_i \beta) - \leq (\mu_1 - x_i \beta)
\]

\[
P(y_i = 3) = \leq (\mu_3 - x_i \beta) - \leq (\mu_2 - x_i \beta)
\]

\[
P(y_i = 4) = \leq (\mu_4 - x_i \beta) - \leq (\mu_3 - x_i \beta)
\]

\[
P(y_i = 5) = \leq (\mu_5 - x_i \beta) - \leq (\mu_4 - x_i \beta)
\]

\[
P(y_i = 6) = \leq (\mu_6 - x_i \beta) - \leq (\mu_5 - x_i \beta) = 1 - \leq (\mu_5 - x_i \beta)
\]

The parameters are estimated using the Maximum Likelihood Estimation method. The log-likelihood function is as follows:

\[
\ln L = \sum_{i=1}^{N} \sum_{j=0}^{m} Z_{ij} \ln [\leq_{ij} - \leq_{i,j-1}]
\]  

(6)

where \(Z_{ij}\) denotes an indicator variable, if \(y_i = j\) is equal to one, while all other variables remain zero.

\[
\leq_{ij} = \leq [y_j = x_i \beta] \leq_{i,j-1} = \leq [y_{j-1} = x_i \beta]
\]

(7)

3.4. Three-Dimensional IPA Approach

Based on the method by Vavra [61], the explicit importance and implicit importance scores were used to form the importance matrix, which was divided into basic factors, performance factors, and excitement factors (see Figure 4). Vavra [61] defined excitement factors as low importance but high implicit importance and the basic factors as high importance but low implicit importance. The explicit importance and implicit importance of performance factors are both high and both low at the same time.

This study utilized the grand means of explicit importance, implicit importance, and performance as the intersection point for constructing the 3-D IPA matrix. Performance was divided into four levels—very low, low, high, and very high—which, in conjunction with importance and implicit importance, could be further divided into 16 areas. Lai and Hitchcock [62] matched a resource allocation strategy for each area. In terms of performance factors, the resource allocation strategy used was consistent with the IPA. In terms of basic factors, when the actual performance is very high or high, the recommendation is to reduce or slightly reduce resource investment. Hence, the performance will reach an average level, as extra resource investment would not improve customer satisfaction. When the actual performance of basic factors is low, it is recommended to invest more resources at a lower priority in order to bring the actual performance level up to average. For excitement factors, when actual performance is high, it is recommended to implement a low-priority strategy instead of resource reduction. When the actual performance of excitement factors is low or very low, two strategies are possible. If resources are sufficient, the recommendation is to make significant improvements in actual performance. In terms of excitement factors, improvements in actual performance could achieve customer satisfaction. If resources are limited, however, in addition to improving the effectiveness of resource allocation, the company should also strive to maintain the status quo because any improvement to performance below the average would be a waste of resources and would not assist with customer satisfaction. A detailed strategy for each area is shown in Table 1.
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Figure 4. Importance grid (source: Vavra [61]).

Table 1. 3-D IPA resources allocation.

<table>
<thead>
<tr>
<th>Actual Performance</th>
<th>Explicit Importance</th>
<th>Implicit Importance</th>
<th>Three-Factor Theory</th>
<th>Original IPA Approach</th>
<th>Resource Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>High</td>
<td>High</td>
<td>Performance</td>
<td>Keep</td>
<td>Keep</td>
</tr>
<tr>
<td>Very High</td>
<td>High</td>
<td>Low</td>
<td>Basic</td>
<td>Keep</td>
<td>Reduce</td>
</tr>
<tr>
<td>Very High</td>
<td>Low</td>
<td>High</td>
<td>Excitement</td>
<td>Reduce</td>
<td>Keep</td>
</tr>
<tr>
<td>Very High</td>
<td>Low</td>
<td>Low</td>
<td>Performance</td>
<td>Reduce</td>
<td>Reduce</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Performance</td>
<td>Keep</td>
<td>Keep</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Basic</td>
<td>Keep</td>
<td>Slightly reduce</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Excitement</td>
<td>Reduce</td>
<td>Low priority</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Performance</td>
<td>Reduce</td>
<td>Reduce</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Performance</td>
<td>Improve</td>
<td>Improve</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Basic</td>
<td>Improve</td>
<td>Low priority</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Excitement</td>
<td>Low Priority</td>
<td>Keep/Improve</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Performance</td>
<td>Low Priority</td>
<td>Low priority</td>
</tr>
<tr>
<td>Very Low</td>
<td>High</td>
<td>High</td>
<td>Performance</td>
<td>Improve</td>
<td>Improve</td>
</tr>
<tr>
<td>Very Low</td>
<td>High</td>
<td>Low</td>
<td>Basic</td>
<td>Improve</td>
<td>Improve</td>
</tr>
<tr>
<td>Very Low</td>
<td>Low</td>
<td>High</td>
<td>Excitement</td>
<td>Low Priority</td>
<td>Keep/Significantly improve *</td>
</tr>
<tr>
<td>Very Low</td>
<td>Low</td>
<td>Low</td>
<td>Performance</td>
<td>Low Priority</td>
<td>Low priority</td>
</tr>
</tbody>
</table>

Note: * depends on the availability of the resources. Source: Lai and Hitchcock [62].

4. Data Analysis

4.1. Basic Data

There were a total of 170 male respondents (37.5%) and 283 female respondents (62.5%). Almost all of the respondents were aged below 50, and more than half were between 21 and 30. In terms of education, 24% of the respondents held a postgraduate degree, and most (290 people, or 64.0%) were college graduates. Overall, 78.8% of the respondents had a monthly income under NT$70,000. Most (46%) had been using the Internet for 6 to 10 years. The daily Internet usage of most respondents (71.1%) was under six hours. Most of the respondents (94.0%) were traveling to overseas destinations in Asia. In terms of online accommodation booking websites, Agoda (160 people, or 35.3%) and Booking.com (156 people, or 34.4%) were used the most often. Most respondents used a credit card as a payment method (349 people, or 77.00%).

4.2. Explicit Importance, Implicit Importance, and Performance

The measurement of the importance of 35 service quality attributes were referred to as “explicit importance” (value set distance is 5.682–6.662), with a grand means of 6.131. The metrics of the ordered probit model-converted 35 service quality attributes and satisfaction
score were referred to as “implicit importance” (value set distance is 0.440–0.629), with a grand means of 0.521. The measurement of the 35 service quality attributes’ performance was called “actual performance” (the value for the group was 5.113 to 5.854), with a grand means of 5.439. The grand means of explicit importance, implicit importance, and actual performance were taken as the 3-D IPA matrix intersection point. According to the magnitude of the numerical values, actual performance was divided into four levels: very high, high, low, and very low. The distinction points were 5.56, 5.40, and 5.29, respectively.

4.3. 3-D IPA Analysis

The 3-D IPA matrix analysis results are shown in Table 2. The 35 service quality attributes, 10 of which were basic factors, were distributed between the “Fulfilment and Responsiveness” and “Safety and Security” facets. Four service quality attributes were excitement factors; these were located in the “Website Functionality,” “Customer Relationships,” “Information Content and Quality,” and “Safety and Security” facets. The remaining 21 service quality attributes were performance factors, which were approximately evenly distributed among the “Website Functionality,” “Customer Relationships,” “Information Content and Quality,” and “Safety and Security” facets.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Explicit Importance</th>
<th>Implicit Importance</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Level</td>
</tr>
<tr>
<td>FR_1</td>
<td>6.362</td>
<td>0.953</td>
<td>H</td>
</tr>
<tr>
<td>FR_2</td>
<td>6.143</td>
<td>0.970</td>
<td>H</td>
</tr>
<tr>
<td>FR_3</td>
<td>6.256</td>
<td>0.962</td>
<td>H</td>
</tr>
<tr>
<td>FR_4</td>
<td>6.264</td>
<td>0.916</td>
<td>H</td>
</tr>
<tr>
<td>FR_5</td>
<td>6.298</td>
<td>0.983</td>
<td>H</td>
</tr>
<tr>
<td>FR_6</td>
<td>6.210</td>
<td>0.997</td>
<td>H</td>
</tr>
<tr>
<td>FR_8</td>
<td>6.214</td>
<td>0.998</td>
<td>H</td>
</tr>
<tr>
<td>FR_9</td>
<td>6.214</td>
<td>1.013</td>
<td>H</td>
</tr>
<tr>
<td>SS_1</td>
<td>6.530</td>
<td>0.829</td>
<td>H</td>
</tr>
<tr>
<td>SS_3</td>
<td>6.364</td>
<td>0.928</td>
<td>H</td>
</tr>
<tr>
<td>WF_1</td>
<td>6.249</td>
<td>0.868</td>
<td>H</td>
</tr>
<tr>
<td>WF_2</td>
<td>6.216</td>
<td>0.915</td>
<td>H</td>
</tr>
<tr>
<td>WF_3</td>
<td>6.192</td>
<td>0.929</td>
<td>H</td>
</tr>
<tr>
<td>WF_4</td>
<td>5.962</td>
<td>1.039</td>
<td>L</td>
</tr>
<tr>
<td>WF_5</td>
<td>5.817</td>
<td>1.123</td>
<td>L</td>
</tr>
<tr>
<td>WF_7</td>
<td>6.055</td>
<td>1.159</td>
<td>L</td>
</tr>
<tr>
<td>CR_1</td>
<td>5.699</td>
<td>1.232</td>
<td>L</td>
</tr>
<tr>
<td>CR_3</td>
<td>5.748</td>
<td>1.174</td>
<td>L</td>
</tr>
<tr>
<td>CR_4</td>
<td>5.728</td>
<td>1.103</td>
<td>L</td>
</tr>
<tr>
<td>CR_5</td>
<td>5.682</td>
<td>1.324</td>
<td>L</td>
</tr>
<tr>
<td>CR_6</td>
<td>5.682</td>
<td>1.362</td>
<td>L</td>
</tr>
<tr>
<td>CR_7</td>
<td>5.962</td>
<td>1.081</td>
<td>L</td>
</tr>
<tr>
<td>IC_1</td>
<td>6.662</td>
<td>0.780</td>
<td>H</td>
</tr>
<tr>
<td>IC_2</td>
<td>6.320</td>
<td>0.888</td>
<td>H</td>
</tr>
<tr>
<td>IC_3</td>
<td>6.490</td>
<td>1.245</td>
<td>H</td>
</tr>
<tr>
<td>IC_5</td>
<td>6.234</td>
<td>0.979</td>
<td>H</td>
</tr>
<tr>
<td>SS_4</td>
<td>6.042</td>
<td>1.123</td>
<td>L</td>
</tr>
</tbody>
</table>

Table 2. Results of 3-D IPA.

The table includes the explicit importance, implicit importance, and performance levels for each of the 35 service quality attributes. The performance levels are divided into four categories: very high (VH), high (H), low (L), and very low (VL). The table also indicates the three-factor theory and IPA strategy, as well as resource allocation priorities.
Table 2. Cont.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Explicit Importance</th>
<th>Implicit Importance</th>
<th>Performance</th>
<th>Three-Factor Theory</th>
<th>IPA Strategy</th>
<th>Resources Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS_5</td>
<td>6.428 0.939 H</td>
<td>0.576 H</td>
<td>0.644 H</td>
<td>5.554 1.148 H</td>
<td>Performance</td>
<td>Keep</td>
</tr>
<tr>
<td>SS_6</td>
<td>6.462 0.923 H</td>
<td>0.629 H</td>
<td>0.685 H</td>
<td>5.541 1.263 H</td>
<td>Performance</td>
<td>Keep</td>
</tr>
<tr>
<td>SS_7</td>
<td>6.547 0.893 H</td>
<td>0.602 H</td>
<td>0.678 H</td>
<td>5.603 1.166 VH</td>
<td>Performance</td>
<td>Low Priority</td>
</tr>
<tr>
<td>WF_6</td>
<td>5.755 1.235 L</td>
<td>0.536 H</td>
<td>0.599 H</td>
<td>5.302 1.260 L</td>
<td>Excitement</td>
<td>Keep/Improve *</td>
</tr>
<tr>
<td>CR_2</td>
<td>5.859 1.209 L</td>
<td>0.523 H</td>
<td>0.568 L</td>
<td>5.302 1.248 L</td>
<td>Excitement</td>
<td>Keep/Improve *</td>
</tr>
<tr>
<td>IC_4</td>
<td>6.055 0.986 L</td>
<td>0.543 H</td>
<td>0.576 H</td>
<td>5.219 1.226 VL</td>
<td>Excitement</td>
<td>Keep/Largely Improve *</td>
</tr>
<tr>
<td>SS_2</td>
<td>6.013 1.184 L</td>
<td>0.604 H</td>
<td>0.655 H</td>
<td>5.636 1.143 VH</td>
<td>Excitement</td>
<td>Reduce</td>
</tr>
<tr>
<td>Grand Mean</td>
<td>6.131 0.521</td>
<td>0.521</td>
<td>0.575</td>
<td>5.439</td>
<td></td>
<td>Keep</td>
</tr>
</tbody>
</table>

Note: WF = Website functionality; FR = Fulfilment and Responsiveness; CR = Customer Relationships; IC = Information Content and Quality; SS = Safety and Security. The bold texts mean these attributes belong to different classifications in the ordered probit model and partial correlation analysis. The classifications in parentheses are evaluated by partial correlation analysis. * depends on the availability of the resources.

4.4. Discussion

Table 2 shows the results of the 3-D IPA. Seven attributes belong to different classifications in the ordered probit model and partial correlation analysis with different resource allocation. To sum up, basic factors can be regarded as the access threshold for the industry and are deemed by network service consumers as the most basic part that must be provided to certain standards. Therefore, operators should satisfy the consumer requirement on “Fulfilment and Responsiveness”; otherwise, the company is very likely to be eliminated by market mechanisms. Reviewing the content of “Fulfilment and Responsiveness,” one may know the operator’s capability and efficiency of problem resolution and its product or service delivery time efficiency and correctness required by consumers, which is the basis for being economically competitive with the current rising consumer awareness. With respect to the level of available websites providing online room reservation services, maintaining the status quo may meet the basic requirements.

Customer evaluations of performance factors show a positive relationship with customer satisfaction, and therefore, performance factors are the service quality attributes to which consumers pay great attention when using online room reservation services. Moreover, the more resources a company inputs, the more benefits it will get. Of the performance factors, quality attributes of the top five services with the highest weight are: “The website does not share my personal information with other sites”; “Easy to find desired information”; “This site protects information about my credit card”; “The website assures me that personal information is protected”; “Provides accurate information.” It can be known that, when using online room reservation services, what matters most to the consumers is the website’s protection of their personal information, including personal data and cash flow safety. Moreover, convenience and correctness for information search are also consumer’s priority considerations. Therefore, operators should preferentially put its resources into strengthening website information safety, improving website use convenience, and guaranteeing information correctness.

In fact, it is excitement factors that need the greatest attention. When a quality attribute is categorized as an excitement factor, its customer feeling evaluation is in a nonlinear and asymmetric relationship with overall customer satisfaction (as shown in Figure 2). That is, if a customer has a high feeling evaluation on an excitement factor, such a factor will be evaluated as important by the customer; if a customer has a low feeling evaluation on an excitement factor, such a factor will be evaluated as less important. Therefore, configuring limited resources to the quality attributes belonging to excitement factors will be the most effective for a company.
Web 2.0 is characterized by user-generated content. The ability to quickly and conveniently search for information has led to an information explosion, and the provision of too much information may cause noise interference in decision making. Therefore, the key of the Website 3.0 concept is curation by which information contents are first filtered in light of conditions such as user preference and usage habits and then presented by way of personal customization. A company should configure its resources according to the Web 3.0 architectural concept so as to provide solutions capable of effectively satisfying consumer demands, while also responding to two service quality attributes in the excitement factor category detailed in this research, namely, “having comprehensive information” and “providing in-depth information.”

With respect to the attribute of “function for users to evaluate accommodation experiences,” the accommodation experience feedback design generally includes rating, text description, photo enhanced explanation, etc. It is suggested that the operator may adopt virtual reality (VR) technology to upgrade the consumer experience exchange from 2D to 3D, which can convey actual experiences in a more realistic way (see Figure 5).

![Figure 5. The distributions of 35 attributes in the 3-D IPA.](image)

Finally, regarding the attribute of “reputation of the website,” consumer trust in a website represents their impression of the operating company. In combination with the local government activities, participating in public benefit activities or periodic special image-shaping activities can not only create market segmentation but also improve corporate awareness and brand image, increase consumer trust in the company, and reduce the perceived risk of customers using the websites. The increase of website reputation will improve the effectiveness feeling of the legacy users, new consumers may select the website when they become aware that the effectiveness of using this website will be higher, and this will once again increase the effectiveness feeling of the legacy users, thus forming a positive feedback. Once the bandwagon effect is formed, the website operation of the enterprise will gain a key market position.
5. Conclusions

This study identified hotel online booking service quality and proposed an ordered probit model approach as an implicit importance conversion method. The result of the application identified seven attributes that belong to different classifications with partial correlation analysis: FR_1—Customers are informed as the transaction is completed, FR_3—Products/services are delivered by the time promised, FR_6—Policies for changing/canceling orders laid out on the site are customer-friendly, SS_1—Features used to protect customers’ information, SS_3—Confirms online payments, WF_7—Providing cross-platform (smartphone, tablet) applications, and CR_2—Function for users to evaluate accommodation experiences.

Strategic actions were developed and recommended for business leaders. The application of science and technology has enabled the improvement of human-driven inefficiency, and internet application has broken time limitation and space blockage and greatly improved service accessibility. With the popularization of internet service technology, the technical services provided by various manufacturers are virtually the same, and therefore, the service quality effectiveness of customers being in contact with service staff is amplified. With respect to the response speed to questions/problems, which was shown to be a concern of consumers, in addition to the pre-categorization for quickening question/problem handling as mentioned above, as the bottleneck may lie in service staff’s acquaintance (experience) with the questions/problems, in-service training (knowledge) can improve the staff’s quality of service, which is an active method to make up for a lack of experience by increasing knowledge. Big data analysis is now in the ascendancy and the key is to provide correct and useful information by curation from pouring network information. On the other side, information safety, privacy on the Internet, and cash flow security also test consumers’ trust in internet service providers. Economic development is consuming substantial resources, which has caused people’s reflection on environment protection and resource sustainability. While earning profits, companies should also perform their social responsibilities. Calling on environment protection and sustainable development and intensifying action by companies can, in addition to setting up a positive corporate image, realize a win-win situation with positive feedback. We conclude that resource allocation performance can improve the service quality of hotel online booking and promote the sustainable development of m-commerce in hotel online booking.

5.1. Theoretical Contribution

This study measured the perceived importance of online booking service quality and the overall satisfaction of individual travelers with overseas destinations. After an extensive literature review, five quality facets—“Website functionality,” “Fulfilment and Responsiveness,” “Customer Relationships,” “Information Content and Quality,” and “Safety and Security”—were obtained along with 35 quality attributes for subsequent analyses. This study applied Vavra’s [61] concepts to correct the three-factor theory method proposed by Kano et al. [54]. Explicit importance and converted implicit importance scores were used to form a matrix to distinguish among basic factors, performance factors, and excitement factors. This conversion is usually completed by multiple regression or partial correlation coefficient methods [15–21,56,57]. This study considered dependent variables as ordinally scaled, so the ordered probit model was applied for the conversion of implicit importance scores. The results obtained were highly reliable, which could be viewed as the main theoretical contribution of this study.

The results showed different classification of attributes between partial correlation coefficient and ordered probit model such as “Customers are informed as transaction is completed,” “Products/services are delivered by the time promised,” “Policies for changing/cancelling orders laid out on the site are customer-friendly,” “Features used to protect customers’ information,” “Confirms online payments,” “Providing cross-platform (smartphone, tablet) applications,” and “Function for users to evaluate accommodation experiences.” Among all of them, there are several items which are categorized as “basic
factors” when treated by ordered probit model, but as “performance factors” when transformed by partial correlation coefficient, such as “Customers are informed as transaction is completed,” “Products/services are delivered by the time promised,” “Policies for changing/cancelling orders laid out on the site are customer-friendly,” “Features used to protect customers’ Information,” and “Confirms online payments.” According to the aspect of current online shopping development, those mentioned above should belong to the basic equipment that an online shopping website should have. Obviously, the classification by the ordered probit model is more in line with the actual situation.

In addition, according to an investigation report of the Institute of Information Industry, the domestic usage rate of smartphones has reached 73.4% and 32% for the tablets. The population using both smartphones and tablets is assumed to exceed 16 million, and the number of 4G users has reached 4.54 million by April 2016 (http://www.ithome.com.tw/news/97479 (accessed on 14 February 2021)). Due to the increased popularization of smartphones and tablets, the service attributes of “Providing cross-platform (smartphone, tablet) applications” is more accurately classified as the “performance factor” since it complies with customers’ using habits.

Finally, the Web 2.0 social networking has made experience sharing gradually become an important component of tourism experience to some travelers. The service attribute of “Function for users to evaluate accommodation experiences” may become the last puzzle of their online shopping journey. Nevertheless, on the other side of convenience, there are some drawbacks, and the risk of leaking personal private information is one of them. Not all users require to share their experiences; therefore, it would be more accurate to classify this attribute as the “excitement factor.” To sum up, the ordered probit model showed better results than the partial correlation coefficient, since the former could effectively respond to data characteristics and well interpretable. With limited resources in the real world, the issue of sustainability issues must continue to be discussed and pay attention.

5.2. Practical Applications

Due to its ease of application, the IPA has become a commonly used analytical technique. However, it is mostly used for general analysis and interpretation. The three-factor theory can deal with the corresponding relationships among nonlinear dependent and independent variables. Thus, many studies have attempted to combine IPA with three-factor theory to effectively describe the two-dimensional relationships between these two variables. This study applied the 3-D IPA model proposed by Lai and Hitchcock [62]. On the basis of the traditional IPA and three-factor theory, different degrees of explicit importance, implicit importance, and actual performance were used to make resource allocation suggestions.

Based on the research results, it is recommended that the service quality attributes for operators to reduce resource configuration should include the following eight items: “Providing cross-platform (smartphone, tablet) applications,” “Customers are informed as transaction is completed,” “Products/services are delivered by the time promised,” “This site delivers the items ordered,” “Policies for changing/cancelling orders laid out on the site are customer-friendly,” “Features used to protect customers’ information,” “Confirms online payments,” and “The website uses symbols and messages that signal that the site is secure.” It can be found that they are all service items that can be automatically completed using modern technologies. What needs special attention is the sound implementation of the system maintenance so as to guarantee the system’s normal operation.

The service quality attributes in need of special attention for improvement include five aspects: “Has comprehensive information,” “Inquiries are answered promptly,” “Function for users to evaluate accommodation experiences,” “Provides concise (not ambiguous) information,” and “Provides in-depth information.” It is suggested that the operators use big data to analyze the consumption tendency and market segmentation. Web 3.0 should be embraced to meet the potential consumer groups in light of their preference and to satisfy consumer requirements. In addition, a reward mechanism could be added to the website.
providing evaluation mechanism, in which, if a consumer conducts consumption behavior under the impact of the experience sharing of any legacy user, points may be granted to such an experience sharer, which may be used by the sharer for a discount in the future. A reward mechanism by adopting point feedback may encourage users to share their personal experience and share consumer experience in a deeper and closer-to-fact way. In addition, the reward mechanism can also attract new consumers to use the website services. Lastly, it is recommended that the online room reservation websites should pay more attention to the speed of responding to the consumer’s questions/problems. The traditional service industry satisfied the customers by using large amounts of human resources. After the technology has replaced a large proportion of human resources, the focus has been changed from “quantity” to “quality.” The high quality and professional service manpower could be able to cope with a technological society which focuses on a quick response. Today, most of the companies are already good at using various communication ways to obtain customers’ information. In addition to traditional ways, such as telephone and email, relevant communication software such as Line, Skype, and Facebook have generally become commonly provided contact details; therefore, the key for the response speed lies in the interior of a company. There should be a standard process when responding to consumer questions/problems, and for special questions/problems, the response duration should be longer. It is suggested that a company should provide a response page for frequently asked questions to reduce the load of back-end customer service staff. A pre-categorized option could also be provided for consumer feedback. Questions/problems can be distributed to different professional staff based on types so as to increase the familiarity of service staff with the same type of problems. Thus, the response time could be effectively reduced, accelerating the speed of answering a question or problem.

5.3. Limitations and Future Research

This research applies a new approach to resource allocation, and provides a theoretical contribution and practical applications. However, the existing limitations have to be considered. The sampling for analysis was conducted in Taiwan Taoyuan International Airport. The findings of this study are limited to a specific area, which has unique characteristics, and thus, the result could not be generalized. Moreover, this study focused on the passengers’ perspective; thus, the resource supply perspective was not considered. The balance of the overall resource allocation and the availability of resources have not been considered. Finally, with the rapid development of 5G networks, future researchers should pay close attention to the development of related applications.

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Conflicts of Interest: The authors declare no conflict of interest.
### Appendix A

#### Dimension 1: Website Functionality

| WF_1. It is quick and easy to complete a transaction | [7–10,14,59,60] |
| WF_2. The search functions are helpful | [7,13,59] |
| WF_3. It is easy to find desired information | [7–10,1–2,14,59] |
| WF_4. Functions as the site should | [13,59] |
| WF_5. Provides in-depth information for customers making purchasing decisions | [12,59,60] |
| WF_6. Has comprehensive information | [10,59] |
| WF_7. Providing cross-platform (smartphone, tablet) applications | New |

#### Dimension 2: Fulfillment and Responsiveness

| FR_1. Customers are informed as the transaction is completed | [11,59] |
| FR_2. Provides a message channel for user comments | [11,12,59] |
| FR_3. Products/services are delivered by the time promised | [9,10,14,59,60] |
| FR_4. This site delivers the items ordered | [9,10,14] |
| FR_5. Help is available when problems are encountered | [7,11,59,60] |
| FR_6. Policies for changing/canceling orders laid out on the site are customer-friendly | [9,14,59] |
| FR_7. Provides Frequently Asked Question information | [59] |
| FR_8. Ready and willing to respond to customer needs | [7,11,60] |
| FR_9. Inquiries are answered promptly | [7,11,59,60] |

#### Dimension 3: Customer Relationships

| CR_1. Platform for users to exchange travel experiences | [7,12,13,59] |
| CR_2. Function for users to evaluate accommodation experiences | New |
| CR_3. Understands specific needs and gives personal attention | [9,11,12] |
| CR_4. Easy for users to turn to the chat room (BBS) for more information | [13,59] |
| CR_5. Personalized features to users | [59] |
| CR_6. Customer loyalty program | New |
| CR_7. Easy to track the delivery of products/services purchased | [7,11,13] |

#### Dimension 4: Information Content and Quality

| IC_1. Provides accurate information | [11,59,60] |
| IC_2. Provides updated Information | [7,11,59] |
| IC_3. Provides concise (not ambiguous) information | [7,11,12,59] |
| IC_4. Provides in-depth information | [7,60] |
| IC_5. Provides very good sources of information | [7] |

#### Dimension 5: Safety and Security

| SS_1. Features used to protect customers’ information | [7–10,12,13,59,60] |
| SS_2. Reputation of the website | [13,59] |
| SS_3. Confirms online payments | [11,13,59] |
| SS_4. The website uses symbols and messages that signal that the site is secure | [60] |
| SS_5. The website assures me that personal information is protected | [7,12,14] |
| SS_6. The website does not share my personal information with other sites | [7–10,59] |
| SS_7. This site protects information about my credit card | [7–10] |

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