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Examining an asymmetric effect between online customer reviews emphasis and overall satisfaction determinants

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ABSTRACT

Do customer online reviews truly reflect the determinants of customer overall satisfaction with hotels? Using a text mining approach: latent semantic analysis and a text regression approach, this study compared the product and service attributes contributing to customer perception on editor-recommended and -nonrecommended hotels at various star levels. This study found that positive and negative attributes contributing to customer perception differ; even for the same attribute, its importance level for customer perception differs between different types of hotels. This study found an asymmetric effect of the focus of online reviews and determinants of customer satisfaction: not all positive/negative textual factors mined from online customer reviews significantly influence their overall satisfaction, and the emphasis level of a certain attribute in customer reviews differs from the relative importance level of the influence of the attribute on customer overall satisfaction. This shows the different psychological mechanisms of customers writing online reviews and their overall satisfaction generation.

1. Introduction

With the rapid development of information technology in the e-tourism era, many customers reserve their hotel rooms online and post online reviews after their stay. These online reviews generate electronic word of mouth (eWOM), which is informal communication directed at online customers related to the consumption experience of products and services (Litvin, Goldsmith, & Pan, 2008). In addition to customer ratings, the online customer textual reviews affect hospitality companies' sales significantly because such open structures provide details about customer consumption experiences and are referred to by future customers (Xu & Li, 2016). Customer textual reviews show customers' perception toward the detailed attributes of products and services, which provides a clue for business managers to improve the corresponding attributes.

Customer satisfaction and dissatisfaction are generated by comparing expectations before the consumption of products and services and the perceived performance of the products and services (Oliver, 1980). Based on market signal theory (Priest, 1981), our study uses the two most informative signals for hotel online booking: hotel star levels and editor recommendation. Because of the different prices and images of hotels with various star levels, customers have different expectations for them (Mauri & Minazzi, 2013; Xie, Zhang, & Zhang, 2014). In addition, various star level hotels have different operations strategies and efficiency procedures that influence their performance (Manes & Tchetchik, 2018; Schuckert, Liu, & Law, 2015). Therefore, customer satisfaction and dissatisfaction and their determinants are influenced by the star levels of hotels. Another phenomenon that appears on the online booking web page is editor reviews for hospitality companies, which can generate more demand (Zhang, Ye, Law, & Li, 2010). These editor reviews represent the opinions of third-party booking websites and experts (Zhang et al., 2010), which influence customer expectation toward the hotels (Mauri & Minazzi, 2013; Zhang et al., 2010). Therefore, customer satisfaction and dissatisfaction and their determinants also vary according to the editor reviews of hotels.

The objective of this study is to examine and compare customers' focus on various product and service attributes of various star level editor recommended and nonrecommended hotels in their reviews, and to examine and compare the importance of the influence of various attributes on customer perception. Regarding the contents of online customer reviews of hotels and their reflection of customer perception, three aspects of literature gaps exist. First, most of the previous studies (e.g., Berezina, Bilgihan, Cobanoglu, & Okumus, 2016; Lau, Lee, & Ho, 2005; Xiang, Schwartz, Gerdes, & Uysal, 2015) identified the types of the products and service attributes that influence customer perception, however, they did not examine the relative importance of these product and service attributes on influencing customer perception. Customers may focus more on some attributes than others, describing them in

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more detail in online reviews. Second, most of the previous studies (e.g., Berezina et al., 2016; Li, Ye, & Law, 2013; Xiang et al., 2015) examined customers' perceptions toward the hotels as a whole. They did not differentiate between the product and service attributes customers had written in online reviews of various star levels of editor-recommended and -nonrecommended hotels.

Third, most of the previous studies assume the product and service attributes mentioned in customers' positive comments lead to customer satisfaction, while the product and service attributes mentioned in negative comments lead to customer dissatisfaction (e.g., Berezina et al., 2016; Xiang et al., 2015; Xu & Li, 2016). Thus, they claimed that all factors mined from online reviews significantly influence customer overall satisfaction (e.g., Xiang et al., 2015; Xu, 2018). However, customers who write online reviews may not only want to show their satisfaction. They may have other motivations, such as altruism and reciprocity (Bronner & De Hoog, 2011), emotional and psychosocial needs (Parsa & Cobanoglu, 2011), obtaining social needs and benefits (Cheung & Lee, 2012), and earning economic benefits (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004). In addition, the contents and language style of online textual reviews are influenced by factors such as emotion and customer demographics (Ullah, Amblee, Kim, & Lee, 2016). Thus, customers' highest focus in a review, namely the most detailed and longest description of a certain product/service attribute or the words/phrases mentioned most frequently in online reviews, do not necessarily indicate that this attribute influences customer satisfaction the most. This phenomenon is referred to the asymmetric effect of online customer reviews focused in this study.

The asymmetric effect of online reviews appears widely in tourism and hospitality sectors, and an examination of the asymmetric effect can provide important information cues on different aspects of information evaluation (Park & Nicolau, 2015). In this study, we employ a text mining approach, latent semantic analysis (LSA), and a text regression approach to examine the asymmetric effect of online customer reviews. The perspective we focus is the asymmetric effect between the emphasis level of certain product and service attributes in online reviews and the importance level of these attributes on influencing customer overall satisfaction. The emphasis level of certain product and service attributes in online reviews is measured by the associated singular value calculated from LSA. This shows the relevance of the review on each textual factor (i.e., certain attributes). Namely, it reflects what customers talk about in their online reviews. We examine the importance level of these attributes through the significance level from text regression. This shows the relative importance of these attributes in influencing customer overall satisfaction. Namely, it reflects what customers care about. Examining this asymmetric effect can help hoteliers explore the business value of online reviews in terms of understanding customer needs, expectations, and perceptions, and thus improve the actions correspondingly with different priorities to enhance customer satisfaction and hotel performance.

In summary, our study contributes to the literature in two respects. First, it is one of the first studies to examine the importance level of hotel product and service attributes on influencing the perception of customers of various star levels of editor-recommended and -nonrecommended hotels according to their online textual reviews. Second, it is one of the first studies examining the asymmetric effect of the importance level of hotel product and service attributes on the description in online customer reviews and on determining overall satisfaction.

The rest of the study is organized as follows. Section two reviews the relevant literature, describes the theoretical background, and proposes the hypotheses; section three describes the research method; section four analyzes the data and summarizes the results; section five conducts the related discussions; section six provides theoretical and managerial implications; and the last section presents conclusions, limitations, and future research extensions.

2. Theoretical background and hypothesis development

2.1. Theoretical background

The theoretical foundation of this study is mainly based on three theories: market signal theory, expectation-disconfirmation theory, and multi-attribute theory. Market signal theory (Priest, 1981) posits that information can be used as a signal for customers to expect the features of products and services (Kelley, 1988). In the online shopping environment, signals are often derived from the product information posted online, which are referred to by online customers (Srinivasan, Anderson, & Ponnavolu, 2002). The online information influences customer perception (Pang, Casalin, Papagiannidis, Muyldermans, & Tse, 2015). For hotel booking, our study considers two types of information as signals: hotel star level and editor recommendation. A higher star level and editor recommendation signal higher-quality products and services, which influences customer expectations (Boulding, Kalra, Staelin, & Zeithaml, 1993).

The expectation-disconfirmation theory proposes that customers compare their expectations before buying products and services with the actual perceptions of how the products and services performed (Oliver, 1980). The expectation, which mainly refers to the expectation of the costs of gaining benefits and rewards (Day, 1977), is often described as *anticipated performance*. Satisfaction and dissatisfaction pertain to outcomes when the actual perceptions of benefits and rewards from the products and services meet or exceed or, alternatively, do not meet the anticipated performance (Churchill & Surprenant, 1982). Expectation-disconfirmation theory also explains the formation of customer satisfaction and dissatisfaction in the online environment (Park, Cho, & Rao, 2015). Although customer satisfaction and dissatisfaction are both customer perceptions formed from individual cognitive processes, these two constructs are qualitatively different (Chen, Lu, Gupta, & Qi, 2014). The concept of customer dissatisfaction is not the direct opposite of customer satisfaction (Chow & Zhang, 2008), and customer satisfaction and dissatisfaction can coexist (Chen et al., 2014). The coexistence of customer satisfaction and dissatisfaction occurs when consumers have mixed feelings toward products and services because they are satisfied with one attribute but dissatisfied with another (Mittal, Ross, & Baldasare, 1998). The market signal theory and expectation-disconfirmation theory explain the various sources of satisfiers and dissatisfiers and the formation mechanism of customer satisfaction and dissatisfaction, which provides the theoretical foundation of our study. Customer satisfaction and dissatisfaction also have an affective nature, which shows the psychological state, expressed as mood or emotion, derived from consumption (Bowen & Clarke, 2002). Both the cognitive and affective image affect customer satisfaction, as shown in the cognitive-affective model of customer satisfaction (del Bosque & San Martín, 2008).

Multi-attribute theory proposes the evaluation distinctions of attributes for their importance in determining customer satisfaction (Aijzen, 1991; Aijzen & Fishbein, 1980). Although various factors influence customer perception, their importance can differ. This explains the reasons that, although customers mention product and service attributes in their textual reviews in great detail, it does not necessarily mean that these product/service attributes have the most significant impact on customer overall satisfaction.

2.2. Hypotheses development

2.2.1. Customer satisfaction and dissatisfaction with hotels

According to previous studies (e.g., Westbrook, 1980), consumer satisfaction refers to a consumer's subjectively derived favorable evaluation of any experience or outcome associated with product consumption. Conceptually, satisfaction is the outcome of a purchase, whereby customers compare the benefits and costs with the anticipated consequences (Bolton & Drew, 1991; Maxham, 2001). Customer

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satisfaction can be differentiated by transaction-specific satisfaction and cumulative satisfaction. Transaction-specific satisfaction is customers' satisfaction/dissatisfaction with a discrete service encounter, which shows customers' evaluation of the focal transaction (Bitner & Hubbert, 1994). Cumulative satisfaction is the customers' overall satisfaction/dissatisfaction with the organization based on all of the encounters and consumption experience, which reflects the evaluation of all previous interactions with the provider (Gelbrich, Gäthke, & Grégoire, 2016). Customers view the conceptualizations of transaction-specific and cumulative satisfaction differently (Bitner & Hubbert, 1994). The transaction-specific satisfaction is highly influenced by the particular events during the transaction, and the cumulative satisfaction is usually formed by the global impressions and general experiences with the business (Jones & Suh, 2000). Cumulative satisfaction can be based on many previous transactions, and be viewed as a function of previous transaction-specific satisfaction (Teas, 1993). Good customer relationship management and service recovery actions can enhance cumulative satisfaction even though the transaction-specific satisfaction is low (Gelbrich et al., 2016). Referring to previous studies (e.g., Bitner, 1990; Parasuraman, Zeithaml, & Berry, 1988), our study considers customer satisfaction to be a transaction-specific measure with respect to a customer's one-time experience of staying in a certain hotel. This is because, operationally, satisfaction is similar to attitude because it represents the summation of multiple attribute satisfaction judgements in this particular transaction (Maxham, 2001). The particular aspects or events customers comment on hotels in their online reviews indicate their transaction-specific satisfaction (Jones & Suh, 2000).

The determinants of customer overall satisfaction with hotels include customers' perceptions of hotels' physical features (room, hotel, and food), prices, locations, and staff (Zhou, Ye, Pearce, & Wu, 2014). Service quality, consumption emotions, and perceived value can also influence customer satisfaction (Chou, 2014; Deng, Yeh, & Sung, 2013; Xu & Gursoy, 2015a). Customer satisfaction with hotels can further be influenced by variables such as room occupancy (Chen, Yang, Li, & Liu, 2015) and appraisal of hotel ambience (Jani & Han, 2014). Higher customer satisfaction toward hotels can enhance loyalty behaviors such as recommendations, revisit intentions, and willingness to pay a premium (Xu & Gursoy, 2015b).

However, fewer studies have discussed customer dissatisfaction with hotels separately from customer satisfaction. Customer dissatisfaction is mainly generated by hotels' service failures (Lee, Sing, & Chan, 2011) and leads to subsequent actions such as negative WOM, complaints, and switching to another service provider (Lee & Hu, 2004). Comparatively, customers are more willing to complain when the core service fails rather than when interactional service fails (Yang & Mattila, 2012). To alleviate customer dissatisfaction and retain loyal customers, service recovery actions such as online responses by management to negative online reviews through explaining service failure reasons, providing extra compensation, and commitment to future improvements are helpful (Gu & Ye, 2014).

Various star ratings of hotels are determined by the different attributes of products and services. Customers pay a higher price for hotels with higher star levels and expect to receive corresponding products and services. The room rate, which indicates the monetary value of the hotel's products and services, influences customers' expectations (Liu, Law, Rong, Li, & Hall, 2013). A higher price positively influences customers' expectations about perceived quality (Anderson, Fornell, & Lehmann, 1994). Customer perception can vary based on the different monetary value of the hotel's products and services.

Customers demand higher product and service quality for higher star level hotels and care about the different attributes of the product and service quality from different star level hotels (Schuckert et al., 2015). The determinants of customer perception toward different star levels for hotels can differ (Li et al., 2013). For lower star-rated hotels, tangibles and sensorial experiences such as cleanliness and quietness influence customer satisfaction most, followed by staff, aesthetics, and location (Ren, Qiu, Wang, & Lin, 2016). For higher star-rated hotels, besides the core products and services, the luxury room amenities and brand (Heo & Hyun, 2015; Liu, Wong, Tseng, Chang, & Phau, 2017) and the hotels' socially responsible actions (Kucukusta, Mak, & Chan, 2013) also influence customer perception and stay behaviors. Based on the preceding discussion, this study advances the following hypotheses:

H1 (H2). The importance level of various positive (*negative*) product and service attributes on influencing customer perception differs between different star level hotels.

With the rapid development of information technology, many customers reserve hotel rooms online, and the ratings and reviews serve as eWOM to influence customers' perceptions, attitudes, and behaviors (Cantallops & Salvi, 2014). eWOM can influence customers' expectations of quality along with the company's image and customers' needs and values (Mauri & Minazzi, 2013). Two types of online reviews typically appear on hotel booking and social media websites: customer reviews and editor reviews. Customers often post ratings and review comments after staying at the hotels, and these reviews influence future customers' visiting decisions (Torres, Singh, & Robertson-Ring, 2015). As third-party reviews, editor reviews often result in recommendation or nonrecommendation to customers, depending on the criteria set by the third party, experience testing, and expert evaluation according to the review formats (Chen & Xie, 2005). The role of editor reviews in influencing customer expectations and behavior differs from that of customer reviews (Zhang et al., 2010). Positive editor reviews/recommendations can serve as certificates influencing customer perception (Heras-Saizarbitoria, Arana, & Boiral, 2015). Customers' expectations differ depending on the valence of the review, which is highly related to the source of the review: customers, editors, or hoteliers (Zeithaml, Bitner, & Gremler, 2006). Editor reviews serve as known eWOM because of the specific source, as opposed to customer reviews, and thus more highly influence customers' expectations regarding the hotel's products and services (Mauri & Minazzi, 2013). Editor reviews can be considered the company's reputation information, which generates customer trust and influences customers' behavior (Fuller, Serva, & Benamati, 2007).

Customers consider editor reviews to be useful and credible because the reviews are issued by a well-known online travel entity (Casaló, Flavián, Guinalíu, & Ekinci, 2015). The influence of customers' expectations on customer perception and behaviors has a different mechanism than do customer reviews (Zhang et al., 2010). Editor reviews that leave positive comments, high ratings, and recommendations represent credible confirmation of a hospitality company's product and service quality and thus increase customer expectations and company attractiveness (Zhang et al., 2010). Editors' or hoteliers' online responses to customer reviews such as those addressing customer complaints by providing explanations using a defensive or accommodative strategy also influence customers' expectations (Gu & Ye, 2014; Mauri & Minazzi, 2013). Therefore, this study proposes the following hypotheses:

H3 (H4). The importance level of various positive (*negative*) product and service attributes on influencing customer perception differs between editor-recommended and editor-nonrecommended hotels.

2.2.2. Customer online reviews of hotels

Customer reviews of hotels describe customers' stay experiences and satisfaction levels (Zhou et al., 2014). From the perspective of the source of customer reviews, traditional reviews take the form of customer service phone calls and customer comment cards (Heung & Lam, 2003; Su, 2004). However, with the rapid development of information technology and the fast growth of internet use, more customers book hotels and share reviews of hotels online (Cantallops & Salvi, 2014). Online customers post their reviews on either hotel booking websites

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such as Expedia (Xiang et al., 2015) or social media websites such as TripAdvisor (Yen & Tang, 2015). The decision of where to post their reviews depends on many factors, including hotel attribute performance and economic incentives (Yen & Tang, 2015).

From the perspective of the forms of online customer reviews of hotels, two forms are submitted by hotel guests and studied by academic researchers: customer ratings (Schuckert et al., 2015) and textual comments (Berezina et al., 2016). Customer ratings, usually a number between one and ten, show customers' overall satisfaction toward the hotel or a specific aspect of its products and services (Torres et al., 2015). Customers can rate the hotels' products and aspects individually, such as location, sleep, room, cleanliness, and service, and, based on these, rate the hotel's overall performance (Schuckert et al., 2015). Many previous studies have explored the positive influence of customer ratings on hotel booking intentions and the corresponding results of hotels' increased online sales and improved financial performance (e.g., Torres et al., 2015). Customer textual comments provide a more comprehensive experience description than customer ratings because of their open structure (Schuckert et al., 2015). Hotel guests' experience and satisfaction can be reflected in textual reviews in detail (Xiang et al., 2015) and thus provide great opportunities for hotel managers to collect effective customer feedback and improve their hotel's products and services accordingly (Lee & Hu, 2004).

From the perspective of the contents of online customer reviews of hotels, customers often describe and make comments about their hotel stay experience. Customers' perception of their hotel experiences are influenced by the quality of the products and services hotel offered, which is reflected and contributed by the various attributes of products and services (Zhou et al., 2014). *Attributes* can be defined as dimensions of a product or service (Slevitch & Oh, 2010). *Products and services* refer to a bundle of attributes that influence customers' choices (Kotler, Brown, & Armstrong, 2003). Customers' satisfaction can be generated from a certain attribute or the whole products or services. Customer satisfaction toward a certain product/service attribute is defined as *attribute satisfaction* (Hunneman, Verhoef, & Sloot, 2017), which can accumulate and positively affect customer overall satisfaction toward the consumption experience and the service provider (Sirohi, McLaughlin, & Wittink, 1998).

Different specific attributes of products and services affect customers' attitudes and perceptions differently, as multi-attribute theory explains (Aijzen & Fishbein, 1980). Therefore, the weights of attributes vary in terms of influencing overall satisfaction. Customers give different importance weights to certain attributes of the products and services, and depending on the weights and the attribute satisfaction, customers achieve their overall attitude and satisfaction with the products and services (Hunneman et al., 2017). In online customer reviews, the attributes customers comment on indicate customers' certain attribute satisfaction, and the overall ratings show customer overall satisfaction with the stay experience.

The different influence of various attributes on customer overall satisfaction is also described by the ring model proposed by Levitt (1983). In the ring model, the innermost ring contains the core attributes of the products and services that are required to meet customer expectations. The attributes on the outer rings support and improve the core attributes, which generate customer delight and satisfaction. The many drivers found for e-service quality have different effects on customer satisfaction (Heim & Field, 2007). Hotels' core products and services can be more influential on customer satisfaction than auxiliary products or services (Peng, Zhao, & Mattila, 2015).

Customer satisfaction is largely influenced by the quality of the products and services hotel offered, which shows the cognitive nature of satisfaction (del Bosque & San Martín, 2008). Customers compare the pre-purchase expectation of the products and services quality with the post-consumption perception of the perceived quality, and then generate their satisfaction level (Churchill & Surprenant, 1982). However, customer satisfaction is also referred to as a traveler's cognitive-affective psychological state derived from the travel experience (Bowen & Clarke, 2002). In other words, customer satisfaction also has an affective nature, which is reflected by the fact the customer satisfaction is also influenced by their emotions and subjective feeling states (Westbrook & Oliver, 1991).

In detail, for the mechanism of generation of affective nature of customer satisfaction, appraisals of consumption consist of various categorical processes that trigger affective responses (Smith, Haynes, Lazarus, & Pope, 1993). The cognitive appraisals elicit emotions or moods, which are subjective feeling states (Stein & Oatley, 1992). Tourists use both the cognitive image (e.g., quality of the amenities and facilities to use) and the affective image (e.g., sleepy/arousing, distressing/relaxing, gloomy/exciting) to evaluate hotels and destinations (Hosany & Prayag, 2013).

Customer emotions influence their reactions to the events (Babin & Griffin, 1998), as shown in customers' action of writing the online reviews and the associated linguistic style of reviews. Travelers' emotions or feelings would be an important part of their decision-making process of whether to post online reviews and their behavior process of choosing what to write and how (San Martín & del Bosque, 2008). In this way, the content focus of online reviews has some bias from customer satisfaction because it contains both customers' affective reactions, such as expressing extreme emotion when writing reviews and customer judgment of the stay experience (del Bosque & San Martín, 2008).

The above facts reflect the motivation of customers writing and posting online reviews includes not only the desire to show their satisfaction/dissatisfaction, but also includes spreading their emotion (Ullah et al., 2016). This includes two aspects: meeting emotional and psychosocial needs (Parsa & Cobanoglu, 2011), and obtaining social needs and benefits through interacting with the online travel community (Cheung & Lee, 2012). In addition, the motivation of writing and posting online reviews also includes altruism and reciprocity (Bronner & De Hoog, 2011): helping future customers choosing hotels, and earning economic benefits through chances to obtain monetary compensation from online travel agents (Hennig-Thurau et al., 2004). Therefore, the contents and language style of online reviews are influenced by their motivation of writing and posting online reviews (Ullah et al., 2016). The customer demographics, such as educational level, gender, and occupation, also influence online reviews' contents and language style (Hu, Bose, Koh, & Liu, 2012). Thus, the emphasis level of product and service attributes mentioned in online customer textual reviews can differ from the importance of these attributes in determining customer overall satisfaction, which we define as an *asymmetric effect* of online reviews in this study. Based on the preceding discussion, this study proposes the following hypotheses:

H5 (H6). There is an asymmetric effect between the emphasis level of product and service attributes mentioned in positive (*negative*) online comments and the importance level of these attributes positively (*negatively*) influencing customer overall satisfaction.

3. Methodology

3.1. Data collection

We collected data from Booking.com, the world's largest third-party hotel booking website. Only travelers who have booked and stayed in the hotels listed on Booking.com can post reviews on the site. As Fig. 1 shows, travelers are asked to post positive reviews (i.e., satisfaction) and negative reviews (i.e., dissatisfaction) separately. Based on Xiang et al.'s (2015) sample selection methodology, we collected the reviews from 600 hotels in the 100 largest U.S. cities, according to the U.S. Census Bureau population estimate (US Census Bureau, 2015). The 600 hotels in the sample include 70 one-star hotels (11.67%), 178 two-star hotels (29.67%), 202 three-star hotels (33.67%), 86 four-star hotels (14.33%), and 64 five-star hotels (10.67%). Overall, 330 collected

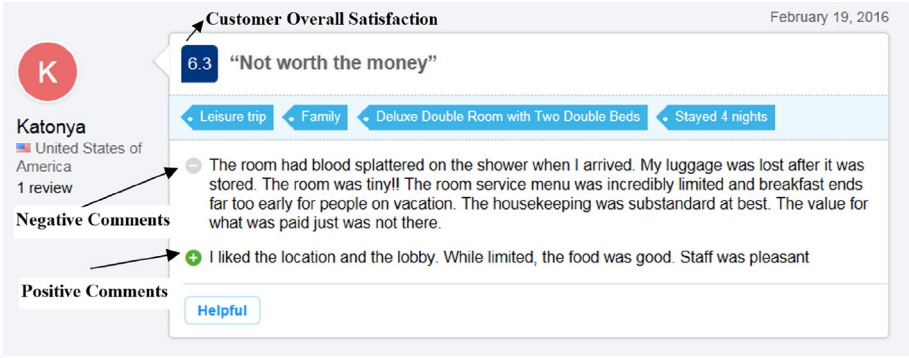

Fig. 1. Screenshot of online customer review webpage on Booking.com.

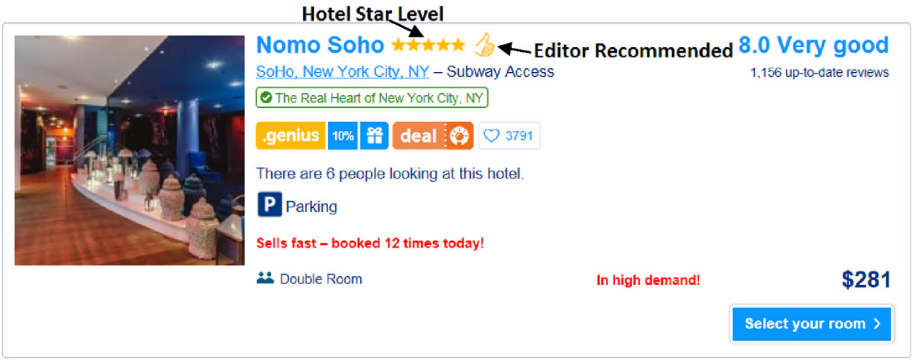

Fig. 2. Screenshot of hotel booking webpage on Booking.com.

hotels (55%) are editor-recommended. As Fig. 2 shows, on the Booking.com website, an editor-recommended hotel is marked with a recommended logo beside the hotel's name for ease of customer perception. Customers can click the recommended logo to view the standardized description of the editor's recommendation, which means the hotel is a member of Booking.com's Preferred Property Program, which groups together hotels that stand out because of their excellent service and quality/price ratio. Being a member of the Preferred Property Program indicates that the hotel meets a specific set of criteria and cares about previous customers' feedback. For each hotel, we generated seven different random numbers as indices and collected the customer reviews that corresponded with those indices. We excluded those who did not post either positive or negative comments from the sample of this study. In all, we obtained 4120 effective customer reviews with both positive and negative comments.

3.2. Research method

In this study, we utilize a text mining approach, LSA, and a text regression method to conduct the online review analysis. LSA is an algebraic-statistical method that can detect the underlying topical structure of a document corpus and extract the hidden semantic structures of words, phrases, and sentences (Evangelopoulos, 2011). Using LSA to examine reviews and conduct summaries is objective because of its mathematical nature. In addition, compared with other text mining methods, LSA is more appropriate for analyzing textual data because it can handle the ambiguity of human languages. One of the complexities of dealing with human languages lies in the fact that multiple words may share the same meaning, and one word may mean different things in different contexts. LSA can capture this type of complexity in human languages. LSA works in a way that is very similar to how the human brain distills meaning from text, and it can identify underlying concepts within textual data (Sidorova, Evangelopoulos, Valacich, & Ramakrishnan, 2008).

Referring to the text mining procedures discussed in prior studies (e.g., Kulkarni, Apte, & Evangelopoulos, 2014), this study used LSA through three steps. For each star level editor-recommended/-non-recommended group of hotels, positive and negative comments were consolidated in separate spreadsheets. These data were loaded into RapidMiner Studio, a leading data mining tool, and processed using the following three steps.

The first step was preprocessing and term reduction. We converted each spreadsheet into a document object in RapidMiner Studio, and each spreadsheet was sequentially assigned a unique document ID. The documents then went through a series of preprocessing procedures. First, all the letters were transformed into lowercase. After this was completed, the documents were tokenized with non-letter separators. Following the tokenization, the "stop words" such as trivial words (e.g., "the," "a," and "an") and all tokens that were less than two letters (e.g., "s," "x") were removed because these words do not provide enough meaningful information, and their presence unnecessarily increases the dimensionality of the term frequency matrix. Next, any words or tokens that appeared in only one document were eliminated because they did not indicate any particular theme. Then, term-stemming techniques were applied to a word list. Term-stemming identified the word's root and considered all words with the same root as one token. This combined variants of the same word and decreased the dimensionality. Last, we apply an n-gram algorithm to identify repeated phrases (e.g., clean room, excellent location, friendly employee, good breakfast) in the documents. These term reduction procedures finally resulted in a word list that consisted of > 1200 tokens in the positive comments data set and > 1800 tokens in the negative comments data set for each type of hotel.

The second step is transformation of term frequency matrix. After preprocessing and term reduction, all documents were transferred into the term frequency by the document matrix. In the matrix, each cell recorded the occurrence frequency for a particular token in a specific document. We manipulated the values in the matrix using a term frequency–inverse document frequency (TF-IDF) weighting method

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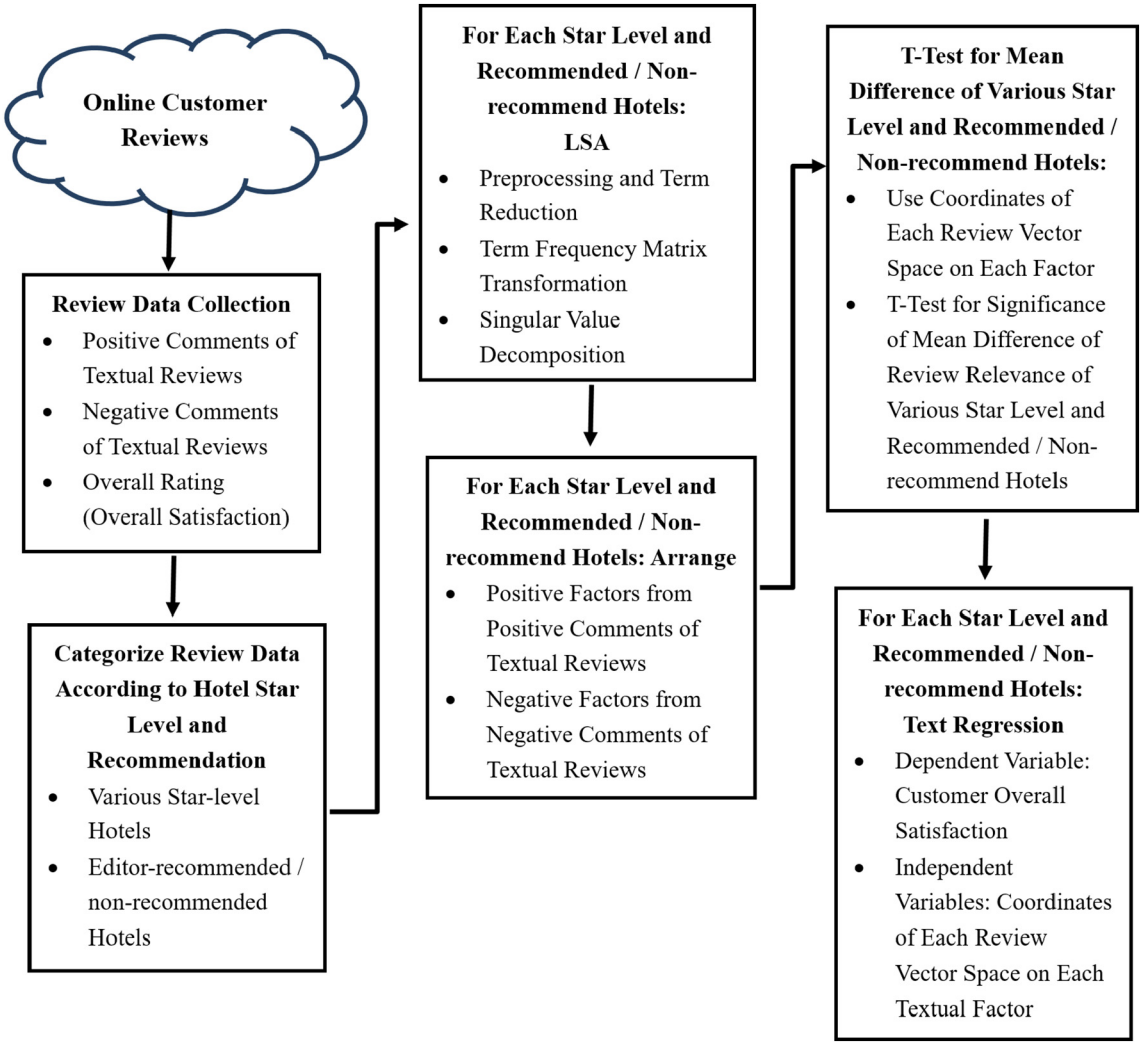

Fig. 3. Procedure of analysis.

(Husbands, Simon, & Ding, 2001). This method assigns more weight on rare terms and discounts the weight of common terms. In this way, the uniqueness of each document, rather than the commonality, can appear in the results (Sidorova et al., 2008).

For the third step, referring to previous studies (e.g., Baker, 2005; Golub & Reinsch, 1970; Klema & Laub, 1980), we conducted singular value decomposition (SVD). This step was based on a theorem from linear algebra, which describes that a rectangular matrix A can be broken down into the production of three matrices—an orthogonal matrix U, a diagonal matrix S, and the transpose of an orthogonal matrix V. That is, $A_{mn} = U_{mm}S_{mn}V_{nn}{}^{T}$, where $U^{T}U = I$ and $V^{T}V = I$. The columns of V are orthonormal eigenvectors of $A^{T}A$; the columns of U are orthonormal eigenvectors of AA^{T}; and S is a diagonal $m \times n$ matrix containing the square roots of eigenvalues from U or V in descending order. In this step, SVD was applied to convert the TF-IDF weighted term matrix into the production of three matrices: the term-by-factor matrix, singular value matrix (square roots of eigenvalues), and the document-by-factor matrix. The term-by-factor matrix illustrates the term loadings on a particular latent factor. The document-by-factor matrix describes the document loadings to a particular latent factor. The singular values (square roots of eigenvalues) indicate the importance of a particular factor.

The interpretation of LSA results can be similar to the factor analysis interpretation (Evangelopoulos, 2011). In this study, we associated each factor with its documents and high-loading terms to aid in the interpretation of the factor. For the online review analytic results of each type of hotel, we created a table containing all high-loading terms and documents sorted by absolute loadings from large to small. Then, we labeled the factors through examining the documents and terms related to a particular latent factor, describing the underlying area, and choosing an appropriate label.

For each of the positive and negative textual factors in each star level editor-recommended/-nonrecommended group of hotels, we conducted a *t*-test using the vector space of the textual reviews (Ngo-Ye & Sinha, 2014). We used the coordinates of each review vector space on each textual factor and calculated the mean of the coordinates of these review vectors for each group of hotels separately for each factor. Through the t-test, we found the significance of the textual coordinate mean difference of these review vectors for each group of hotels on each factor, which describes the relevance of the text on the factor, namely the importance level of that product/service attribute on influencing customer perception.

Last, we conducted text regressions utilizing the vector space of each textual review (Ngo-Ye & Sinha, 2014; Xu, 2018). The dependent variable is the customer overall satisfaction rating. The independent variables are the coordinates of each online review vector space on the corresponding textual factors found for each group of hotels. To compare the relative importance of each textual factor's influence on customer overall satisfaction, we reported the standardized coefficients in the text regressions. The procedures of analysis in this study can be found in Fig. 3.

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Table 1
The positive textual factor mined from the customer positive comments.

Factors	Interpretations (labels)	High-loading terms
Factor 1	Nice room (NR)	room, bed, comfort, bed_comfort, clean, room_clean, nice_room, room_great, spaciou, room_comfort
Factor 2	Good location (GL)	locat, good, locat_great, good_locat, great_locat, walk, station, minut, place, locat_hotel
Factor 3	Friendly staff (FS)	friendli_staff, friendli, friendli_help, quick, staff_friendli, warm, frond_desk, servic, staff, ladi
Factor 4	Good value (GV)	great_price, price_reason, price, worth, affordable, monei_value, cost, room_rate, cheap, good_price
Factor 5	Good shuttle service (GS)	airport, shuttl, shuttle_servic, shuttle_airport, free_shuttl, driver, free_shuttl_servic, airport_shuttl, free_shuttl_airport, access_airport
Factor 6	Good facility (GF)	modern, beauty, facil, pool_area, gym, amenity, pool, facil_great, architectur, build
Factor 7	Good breakfast (GB)	breakfast, great_breakfast, breakfast_excel, free_breakfast, breakfast_includ, fresh, good_breakfast, continent_breakfast, breakfast_nice, food
Factor 8	Nice hotel atmosphere (HA)	hotel, beauty, beauty_clean, nice, nice_hotel, hotel_atmosphere, hotel_beauti, hotel_good, amaz, décor

4. Results

4.1. Factors mined from positive comments and negative comments from online reviews

Utilizing LSA, as shown in Fig. 1, we found eight positive textual factors from the positive comments of online reviews: nice room (NR), good location (GL), friendly staff (FS), good value (GV), good shuttle service (GS), good facility (GF), good breakfast (GB), and nice hotel atmosphere (HA).

Utilizing LSA, as shown in Fig. 2, we found 17 negative textual factors from the negative comments of online reviews. These include room- and facility-related issues, such as bad room amenities (BR), uncomfortable bed (UB), dirty room (DR), bathroom issue (BI), and old facility (OF); staff- and service-related issues: rude staff (RS) and bad service (BS); operations issues, including poor Wi-Fi (PW), noise (NO), security issue (SI), smoke (SM), parking (PA), pool issue (PI), and hotel access and transportation issue (AT); reservation and overcharge issues, such as reservation and checking-in process (RC) and overcharge issues (OI); and a food issue, which was poor breakfast (PB).

For demonstration purposes, we selected the top 10 terms as the "high-loading terms" from > 1200 terms contained in each of the factors. The LSA results indicate that these top factors cover over 95% of all the unique terms and reviews, showing that these factors represent all aspects of positive and negative comments toward each star level for editor-recommended and -nonrecommended hotels.

4.2. The positive and negative textual review relevance on each attribute

Tables 3 and 4 show the mean of the coordinates of each review vector space of the online reviews on each positive (Table 3) and negative (Table 4) textual factor (i.e., a particular product/service attribute). A higher value shows the higher relevance of the online reviews on the particular product and service attributes. The blank cells in Tables 3 and 4 show that the corresponding textual factors are not mined from the particular hotel group reviews.

4.3. The influence of positive and negative attributes on customer overall satisfaction

Tables 5 and 6 present the results of text regressions showing the influence of positive (Table 5) and negative (Table 6) product and service attributes on customer overall satisfaction. Standardized coefficients are reported for a comparison of the relative importance of these attributes on influencing customer overall satisfaction.

5. Discussion

5.1. The importance of various attributes in influencing customer perception between different star level hotels

From Tables 1 and 2, for each type of hotel, the positive textual factors differ from negative textual factors. Comparatively, the positive

Table 2
The negative textual factor mined from the customer negative comments.

Factors	Interpretations (labels)	High-loading terms
Room and facility related issues		
Factor 1	Bad room amenities (BR)	coffe_maker, hair_dryer, fridg, TV, furnitur, upgrad, lamp, tile, floor, chair
Factor 2	Uncomfortable bed (UB)	bed, sheet, bed_uncomfort, uncomfort, rough, sleep, pillow, doubl_bed, sofa, sofa_bed
Factor 3	Dirty room (DR)	dirti, carpet, housekeep, replace, sheet, towel, room_dirti, towel_rack, floor, filthi_carpet
Factor 4	Bathroom issue (BI)	water, shower, hot_water, hot, tub, cold, bath_tub, towel, sink, cold_shower
Factor 5	Old facility (OF)	elevator, old, facil, stair, hallway, paint, handicap, repair, lobbi, remodel
Staff and service related issues		
Factor 6	Rude staff (RS)	staff, rude, staff_rude, terribl, front_desk, unfriendli, lack, servic, mistak, desk_clerk
Factor 7	Bad service (BS)	service, service_slow, slow, room_servic, service_poor, terribl, time, offer, lazi, hous_keep
Operations issues		
Factor 8	Poor Wi-Fi (PW)	wifi, slow, wifi_slow, connect, wifi_terribl, poor_wifi, slow_wifi, weak, poor, internet
Factor 9	Noise (NO)	nois, lot, loud, sound, hard_sleep, noise_air_condition, noisi_hear, hear, traffic, neighbor
Factor 10	Security issue (SI)	secur, dark, surround, area, feel_unsafe, danger, trouble, anxieti, keep_away, lock_door
Factor 11	Smoke (SM)	smoke, smell, smoke_room, smell_smoke, smelt, non_smoke, cigarette, smell_room, non_smoke_room, bad_smell
Factor 12	Parking (PA)	park, garage, paid, fee, self, lot, valet_park, pai_park, valet, park_garag
Factor 13	Pool Issue (PI)	pool, area, pool_area, swim, repair, water, us_pool, pool_i, pool_water, tub_pool,
Factor 14	Hotel access and transportation issue (AT)	bus_plan, get_transport_hotel, cab, phone_take, phone_take_cab, i_wait, transport, busi, taxi, transport_hotel
Reservation and overcharge issues		
Factor 15	Reservation and checking in process (RC)	check, front, desk, front_desk, check_take, minut_check, reserve, queue, i_check, book_problem
Factor 16	Overcharge issue (OI)	over_charg, charg, price, pai, credit_card, charg_room, offer, fee_hidden, super_expense, overprice
Food issues		
Factor 17	Poor breakfast (PB)	breakfast, continent_breakfast, breakfast_includ, food, egg, menu, drink, bread, select, breakfast_poor

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Table 3
Mean difference of positive textual review relevance between each group of hotels.

Factors	Labels (LS)	Hotels									
		1Y	2Y	3Y	4Y	5Y	1N	2N	3N	4N	5N
Factor 1	NR	0.0418[1a]	0.0061[1b]	0.0089[1c]	0.0236[1d]	0.0320[1e]	0.0141[1f]	0.0340[1g]	0.0125[1h]	0.0373[1i]	0.0239[1j]
Factor 2	GL	0.0283[2a]	0.0209[2b]	0.0192[2c]	0.0167[2d]	0.0318[2e]	0.0422[2f]	0.0212[2g]	0.0169[2h]	0.0365[2i]	0.0271[2j]
Factor 3	FS	0.0240[3a]	0.0234[3b]	0.0037[3c]	0.0426[3d]	0.0237[3e]	0.0122[3f]	0.0185[3g]	0.0294[3h]		0.0379[3i]
Factor 4	GV	0.0331[4a]	0.0157[4b]				0.0171[4c]	0.0123[4d]			
Factor 5	GS			0.0062[5a]				0.0176[5b]	0.0110[5c]	0.0328[5d]	
Factor 6	GF					0.0338					0.0302
Factor 7	GB						0.0164[6a]		0.0107[6b]		0.0278[6c]
Factor 8	HA									0.0359	

Remark:
(1) 1Y: Hotel at one-star level and with editor recommendation; 1 N: Hotel at one-star level and without editor recommendation. The similar logic applies for other hotel group notation.
(2) At p = 0.05 level.
1a: 1Y is statistically different from all hotels except 4N.
1b: 2Y is statistically different from 1Y, 4Y, 5Y, 2N, 4N, 5N.
1c: 3Y is statistically different from 1Y, 4Y, 5Y, 2N, 4N, 5N.
1d: 4Y is statistically different from all hotels except 5N.
1e: 5Y is statistically different from all hotels except 2N and 4N.
1f: 1N is statistically different from 1Y, 4Y, 5Y, 2N, 4N, 5N.
1g: 2N is statistically different from all hotels except 4N.
1h: 3N is statistically different from 1Y, 4Y, 5Y, 2N, 4N, 5N.
1i: 4N is statistically different from all hotels except 5Y and 2N.
1j: 5N is statistically different from all hotels except 4Y.
2a: 1Y is statistically different from all hotels except 5Y and 5N.
2b: 2Y is statistically different from 1Y, 5Y, 1N, 4N.
2c: 3Y is statistically different from 1Y, 5Y, 1N, 4N, 5N.
2d: 4Y is statistically different from 1Y, 5Y, 1N, 4N, 5N.
2e: 5Y is statistically different from 2Y, 3Y, 4Y, 1N, 2N, 3N, 5N.
2f: 1N is statistically different from all hotels except 4N.
2g: 2N is statistically different from 1Y, 5Y, 1N, 4N.
2h: 3N is statistically different from 1Y, 5Y, 1N, 4N, 5N.
2i: 4N is statistically different from all hotels except 5Y.
2j: 5N is statistically different from all hotels except 1Y and 5Y.
3a: 1Y is statistically different from 3Y, 4Y, 1N, 5N.
3b: 2Y is statistically different from 3Y, 4Y, 1N, 5N.
3c: 3Y is statistically different from all hotels except 4N.
3d: 4Y is statistically different from all hotels except 4N and 5N.
3e: 5Y is statistically different from 3Y, 4Y, 1N, 5N.
3f: 1N is statistically different from all hotels except 2N and 4N.
3g: 2N is statistically different from all hotels except 1N and 4N.
3h: 3N is statistically different from 3Y, 4Y, 1N, 2N, 5N.
3i: 5N is statistically different from all hotels except 4Y.
4a: 1Y is statistically different from 2Y, 1N, 2N.
4b: 2Y is statistically different from 1Y.
4c: 1N is statistically different from 1Y.
4d: 2N is statistically different from 1Y.
5a: 3Y is statistically different from 2N, 4N.
5b: 2N is statistically different from 3Y, 4N.
5c: 3N is statistically different from 4N.
5d: 4N is statistically different from 3Y, 2N, 3N.
6a: 1N is statistically different from 5N.
6b: 3N is statistically different from 5N.
6c: 5N is statistically different from 1N, 3N.

textual factors are more general and include the core products and services offered by hotels. For all types of hotels, the positive textual factors include nice room quality and good location. Comparatively, the negative textual factors are more specific, and there are more negative factors than positive factors.

Our results support Hypothesis 1. From Table 3, for each star level group of hotels, the importance of positive attributes in influencing customer perception differs. This is reflected by two aspects. First, some positive factors are mined only from certain star levels of hotels. For example, good value is only mentioned by customers from low star level hotels (i.e., one-star and two-star hotels) because the budget travelers who stay in one-star hotels care about the monetary value of the hotel much more than travelers staying in higher star level hotels (Xie et al., 2014). Good monetary value indicates higher product and service/cost ratio performance. Customers staying in lower star level hotels typically have lower annual incomes (Ren et al., 2016), and lower hotel rates greatly affect their satisfaction (Chen et al., 2015; Nash, Thyne, & Davies, 2006). The good value is considered the most important feature of lower star level accommodations and becomes one of the lower-rated hotels' competitive strategies (Fiorentino, 1995; Martin & Isozaki, 2013; Nash et al., 2006). Second, even though nice room quality and good location are mentioned by all customers, they have different

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importance in influencing the perception of customers staying in hotels of different star levels. For example, the nice room quality attribute is mentioned most for the higher star level hotels (four-star and five-star hotels), showing that higher star level hotels focus more on the luxury room amenities and high room quality (Heo & Hyun, 2015).

Similarly, as shown in Table 4, results support Hypothesis 2. For each star level group of hotels, the importance of negative attributes in influencing customer perception differs. Different star level hotels have different types and levels of cons, which influences customer perception. Some negative factors, such as smoke, were mined only from lower star level hotels. However, higher star level hotels do not have fewer negative types of attributes than lower star level hotels. Customers paid more for higher star level hotel stays, and thus the raised expectation makes them feel a different perceived quality of the hotel product and service attributes compared with lower star level hotels. However, as shown in the mean difference of the vector space of the online reviews on each negative attribute on Table 4, customers tend to focus more and describe more details about the negative attributes of lower star level hotels compared with higher star level hotels. Thus, for a certain negative attribute, the lower star level hotels have even worse performance than higher star level hotels, which raises customer negative perception even more.

5.2. The importance of various attributes in influencing customer perception between editor-recommended and -nonrecommended hotels

Our results support Hypothesis 3. As shown in Table 3, for editor-recommended and editor-nonrecommended hotels, the importance of positive attributes in influencing customer perception differs. Editor-nonrecommended hotels have even more types of positive textual factors mined from positive comments, such as good breakfast and nice hotel atmosphere. For the same factors, such as nice room quality and good location, customers comment on these attributes for editor-nonrecommended hotels even more than for editor-recommended hotels. This is because customers staying in editor-nonrecommended hotels may have lower expectations than for editor-recommended hotels and thus perceive the quality of the products and attributes differently, which raises their positive perception. In addition, the editor-recommended hotels have more standard operations than editor-nonrecommended hotels because they must follow the standard policy to join in Booking.com's Preferred Property Program. Thus, customers will have a less surprising feeling about their operations, which leads to less commenting on these editor-nonrecommended hotels in their online reviews. For example, hotel atmosphere is an additional textual factor mined from four-star editor-nonrecommended hotels. Customers' experiential value and symbolic value can be enhanced by the hotels' atmosphere (Chen & Peng, 2014). The decoration provides complementary benefits to customers and improves customers' intangible feelings, thus raising their delight (Loureiro & Kastenholz, 2011).

Our results support Hypothesis 4. As shown in Table 4, for editor-recommended and editor-nonrecommended hotels, the importance of negative attributes in influencing customer perception differs. Editor-nonrecommended hotels have more negative textual factors mined from negative comments than editor-recommended hotels, such as pool issues, access and transportation issues, and reservation and check-in issues. This shows that editor- nonrecommended hotels need to improve more within their various operations issues to reach a specific set of criteria to meet customer expectations. Even for the same attributes customers mention in their negative comments, customers staying in editor-nonrecommended hotels focus on them more, showing they are more frustrated by these attributes. The severity of most negative product/service attributes, such as facility issues (e.g., uncomfortable bed, bathroom issue, old facility), rude staff, and operations issues (e.g., poor Wi-Fi, smoke, pool issues), is higher for editor-nonrecommended hotels, as shown by the highest coordinate values for those negative attributes for editor-nonrecommended hotels, which are significantly higher than for editor-recommended hotels. The higher coordinate values of those negative attributes show that customers emphasize those attributes more in their online reviews, showing that they are bothered more by those negative attributes.

5.3. The asymmetric effects from online reviews

Our results support Hypothesis 5. As shown in Table 5, two types of asymmetric effects exist. For the first type of asymmetric effect, not all positive textual factors mined from online customer reviews significantly influence their overall satisfaction positively. For example, for one-star editor-recommended hotels, although customers frequently mentioned four attributes in their online textual reviews—nice room quality, good location, friendly staff, and good value—only good value significantly influences their overall satisfaction positively. For the second type of asymmetric effect, the relative importance level of the influence of a certain attribute on customer overall satisfaction differs from the focus level of the attribute in online customer reviews. In Table 5, the singular values reflect how much variance a factor explains (Baker, 2005). A higher singular value indicates that customers describe

Table 4
Mean difference of negative textual review relevance between each group of hotels.

Factors	LS	Hotels									
		1Y	2Y	3Y	4Y	5Y	1N	2N	3N	4N	5N
Room and facility related issues											
Factor 1	BR	0.0287[1a]	0.0156[1b]	0.0092[1c]	0.0230[1d]		0.0213[1e]				
Factor 2	UB				0.0203[2a]			0.0147[2b]	0.0121[2c]		0.0300[2d]
Factor 3	DR								0.0108		
Factor 4	BI			0.0093[3a]	0.0236[3b]	0.0269[3c]			0.0123[3d]	0.0321[3e]	
Factor 5	OF	0.0368[4a]	0.0201[4b]	0.0048[4c]			0.0214[4d]	0.0195[4e]			0.0290[4f]
Staff and service related issues											
Factor 6	RS	0.0288[5a]			0.0175[5b]			0.0176[5c]		0.0365[5d]	0.0380[5e]
Factor 7	BS					0.0302					
Operations issues											
Factor 8	PW	0.0128[6a]	0.0194[6b]			0.0251[6c]			0.0135[6d]	0.0250[6e]	0.0361[6f]
Factor 9	NO	0.0278[7a]	0.0111[7b]			0.0318[7c]	0.0236[7d]	0.0208[7e]			
Factor 10	SI		0.0175				0.0189	0.0195			
Factor 11	SM			0.0081[8a]			0.0157[8b]	0.0194[8c]			
Factor 12	PA				0.0182	0.0234					
Factor 13	PI								0.0096		
Factor 14	AT									0.0359	

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Table 4 (*continued*)

Factors	LS	Hotels									
		1Y	2Y	3Y	4Y	5Y	1N	2N	3N	4N	5N
Reservation and overcharge issues											
Factor 15	RC								0.0154		
Factor 16	OI		0.0199[9a]	0.0098[9b]			0.0193[9c]				
Food issues											
Factor 17	PB	0.0275[10a]	0.0194[10b]	0.0106[10c]		0.0253[10d]					0.0270[10e]

Remark:
(1) 1Y: Hotel at one-star level and with editor recommendation; 1N: Hotel at one-star level and without editor recommendation. The similar logic applies for other hotel group notation.
(2) At p = 0.05 level.
1a: 1Y is statistically different from 2Y, 3Y, 1N.
1b: 2Y is statistically different from 1Y, 4Y.
1c: 3Y is statistically different from 1Y, 4Y, 1N.
1d: 4Y is statistically different from 2Y, 3Y.
1e: 1N is statistically different from 1Y, 3Y.
2a: 4Y is statistically different from 2N, 3N, 5N.
2b: 2N is statistically different from 4Y, 5N.
2c: 3N is statistically different from 4Y, 5N.
2d: 5N is statistically different from 4Y, 2N, 3N.
3a: 3Y is statistically different from 4Y, 5Y, 4N.
3b: 4Y is statistically different from 3Y, 3N, 4N.
3c: 5Y is statistically different from 3Y, 3N.
3d: 3N is statistically different from 4Y, 5Y, 4N.
3e: 4N is statistically different from 3Y, 4Y, 3N.
4a: 1Y is statistically different from 2Y, 3Y, 1N, 2N, 5N.
4b: 2Y is statistically different from 1Y, 3Y, 5N.
4c: 3Y is statistically different from 1Y, 2Y, 1N, 2N, 5N.
4d: 1N is statistically different from 1Y, 3Y, 5N.
4e: 2N is statistically different from 1Y, 3Y, 5N.
4f: 5N is statistically different from 1Y, 2Y, 3Y, 1N, 2N.
5a: 1Y is statistically different from 4Y, 2N, 4N, 5N.
5b: 4Y is statistically different from 1Y, 4N, 5N.
5c: 2N is statistically different from 1Y, 4N, 5N.
5d: 4N is statistically different from 1Y, 4Y, 2N.
5e: 5N is statistically different from 1Y, 4Y, 2N.
6a: 1Y is statistically different from 2Y, 5Y, 4N, 5N.
6b: 2Y is statistically different from 1Y, 5N.
6c: 5Y is statistically different from 1Y, 3N, 5N.
6d: 3N is statistically different from 5Y, 4N, 5N.
6e: 4N is statistically different from 1Y, 3N, 5N.
6f: 5N is statistically different from 1Y, 2Y, 5Y, 3N, 4N.
7a: 1Y is statistically different from 2Y, 2N.
7b: 2Y is statistically different from 1Y, 5Y, 1N, 2N.
7c: 5Y is statistically different from 1Y, 3N, 5N.
7d: 1N is statistically different from 2Y.
7e: 2N is statistically different from 1Y, 2Y, 5Y.
8a: 3Y is statistically different from 1N, 2N.
8b: 1N is statistically different from 3Y.
8c: 2N is statistically different from 3Y.
9a: 2Y is statistically different from 3Y.
9b: 3Y is statistically different from 2Y, 1N.
9c: 1N is statistically different from 3Y.
10a: 1Y is statistically different from 2Y, 3Y.
10b: 2Y is statistically different from 1Y, 3Y, 5Y.
10c: 3Y is statistically different from 1Y, 2Y, 5Y, 5N.
10d: 5Y is statistically different from 3Y.
10e: 5N is statistically different from 2Y, 3Y.

more details about the corresponding textual factor. For example, for the three-star editor-recommended hotels, although customers describe in the most detail the good location attributes (the singular value is ranked first), its relative importance in influencing customer overall satisfaction is only ranked third. Conversely, although nice room quality is described in the least detail in online reviews, its relative importance in customer overall satisfaction is the highest. One possible reason is that customers have many different motivations to write online reviews. A detailed description of a certain attribute can result from altruism and reciprocity through helping future customers choose hotels by introducing more details (Bronner & De Hoog, 2011). Therefore, the level of detail in a description of a certain attribute does not match the relative importance of that attribute in influencing customer overall satisfaction. Customer overall satisfaction depends on the gap between

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Table 5
The influence of positive attributes on customer overall satisfaction.

LS	Hotels									
	1Y	2Y	3Y	4Y	5Y	1N	2N	3N	4N	5N
NR	0.0629 (3) [2.399, *1*]	0.0353 (4) [2.843, *1*]	0.1147***(1) [2.575, *4*]	0.0231 (3) [1.834, *3*]	0.2560*** (1) [1.723, *3*]	0.1991*** (3) [2.472, *3*]	0.2279*** (1) [2.599, *1*]	0.0172 (4) [2.607, *2*]	0.0134 (3) [1.928, *1*]	0.0629 (4) [2.145, *2*]
GL	0.0079 (4) [2.350, *2*]	0.0261 (3) [1.927, *4*]	0.0860** (3) [3.208, *1*]	0.1311* (2) [2.012, *2*]	0.0576 (3) [1.781, *2*]	0.6226*** (1) [2.736, *1*]	0.0048 (5) [2.135, *4*]	0.0691 (3) [2.463, *3*]	0.0482 (2) [1.644, *4*]	0.0625 (5) [1.754, *4*]
FS	0.0947 (2) [2.034, *3*]	0.0721* (1) [2.655, *2*]	0.0900*** (2) [2.955, *2*]	0.1520** (1) [2.469, *1*]	0.0978 (2) [2.032, *1*]	0.4494*** (2) [2.477, *2*]	0.0414 (4) [0.0414, *3*]	0.1342*** (1) [2.907, *1*]	0.0646* (1) [1.785, *3*]	0.1840** (1) [2.272, *1*]
GV	0.1614** (1) [1.781, *4*]	0.0582 (2) [2.578, *3*]				0.0962 (5) [0.0962, *4*]	0.1511** (2) [2.356, *2*]			
GS			0.0506 (4) [2.634, *3*]				0.1164** (3) [2.077, *5*]	0.0016 (5) [2.130, *5*]		
GF					0.0306 (4) [1.548, *4*]					0.1147* (2) [1.734, *5*]
GB						0.1161 **(4) [1.944, *5*]		0.0822** (2) [2.235, *4*]		0.0703 (3) [1.921, *3*]
HA									0.0063 (4) [1.857, *2*]	

Remark:

(1) *p < 0.01, **p < 0.05, ***p < 0.001.
(2) Standardized coefficients are reported.
(3) Number in () shows the relative importance (in the rank) of each factor mined from the corresponding group of hotels on influencing the customer overall satisfaction. The first number in [] shows the singular value of each factor mined from the corresponding group of hotels online reviews, and the second number (in *italic*) in [] shows the *rank* of singular value of each factor mined from the corresponding group of hotels online reviews.

customer expectation and the perceived quality, and it is more influenced by the core attributes of hotels (Peng et al., 2015). Comparatively, the positive attribute of friendly staff has the highest positive influence on customer overall satisfaction, as shown in Table 5; for most groups of hotels, the influence is significant, and the relative importance level of the influence is higher than for most other attributes. This shows the important role of staff training and their positive attitude and behavior in generating customer overall satisfaction in the service-intensive hospitality industry (Xu & Li, 2016).

Our results support Hypothesis 6. As shown in Table 6, not all negative product and service attributes mentioned in negative comments significantly negatively influence customer overall satisfaction. Similar to the positive side above, the relative importance level of the influence of a certain negative attribute on customer overall satisfaction differs from the focus level of the attribute in online customer reviews. In addition, we find that more negative attributes mined from editor-recommended hotels have a significant negative influence on customer overall satisfaction compared with editor-nonrecommended hotels. This may be because customers have higher expectations of editor-recommended hotels, and thus it is more likely that their product and service attributes fall below their expectations, which reduces customer overall satisfaction. In addition, smoke is the only negative attribute that, whenever mentioned in the online reviews, significantly negatively influences customer overall satisfaction. Therefore, hotels should make specific efforts regulating smoking issues to alleviate customer dissatisfaction.

6. Implications

6.1. Theoretical implications

Our study identified and compared the textual factors mined from editor-recommended and -nonrecommended hotels with various star levels from customers' online reviews. In addition, our study identified and compared the role of these factors in influencing customer overall satisfaction. The comparison is based on four aspects. First, for each type of hotel, we find that textual factors from positive comments and negative comments differ. Second and third, our study compares the type and focus level of the attributes mined in positive and negative comments among different star level hotels and between editor-recommended and -nonrecommended hotels. The findings support the expectation–disconfirmation model (Oliver, 1980). Because of customers' different expectations toward different star level hotels and editor-recommended and -nonrecommended hotels and because of the different operating strategies of various types of hotels, the type and focus level of the attributes mined in positive and negative comments from different star level hotels and editor-recommended and -nonrecommended hotels differ.

Last, we compare the relative importance level of the influence of a certain positive/negative attribute on customer overall satisfaction with the focus level of that attribute in online customer reviews. We find that not all factors mined from online reviews significantly influence customer overall satisfaction. Our findings extend the three-factor theory (Matzler & Sauerwein, 2002), which identifies the different roles of basic factors (dissatisfiers), excitement factors (satisfiers), and hybrid factors (both satisfiers and dissatisfiers) on customer perception. The fourth type of factors we found can be named neutral factors, which are mentioned in the online reviews, but they do not have a significant influence on customer overall satisfaction. In addition, we found an asymmetric effect between the focus level of the attributes in online reviews and the relative importance level of the attributes in influencing customer overall satisfaction. This reveals the attributes of what customers talk about (the motivation for writing online reviews) and the attributes of what customers care about (the attributes that influence customer overall satisfaction) can differ. This confirms the multi-attribute theory (Aijzen & Fishbein, 1980) and the innermost ring of this model (Levitt, 1983), showing the distinctions in evaluations of attributes of products and services for their importance in deciding customer perception (Aijzen, 1991); the core attributes play a more important role in influencing customer perception.

6.2. Managerial implications

Identifying the determinants of customer overall satisfaction is the first step for hoteliers to improve hotels' operating efficiency and performance. Depending on customers' expectations and concerns toward

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Table 6
The influence of negative attributes on customer overall satisfaction.

LS	Hotels									
	1Y	2Y	3Y	4Y	5Y	1N	2N	3N	4N	5N
Room and facility related issues										
BR	−0.1426* (4) [1.536, *5*]	−0.0853* (4) [1.941, *3*]	−0.1613*** (1) [2.427, *2*]	−0.0428 (4) [1.589, *4*]		−0.0762 (3) [1.864, *2*]				
UB				−0.1445** (2) [1.74, *2*]			−0.1641*** (2) [2.104, *2*]	−0.0176 (5) [1.977, *6*]		−0.1824** (2) [1.797, *3*]
DR								−0.1001*** (1) [2.137, *3*]		
BI			−0.0754** (4) [2.311, *3*]	−0.0636 (3) [1.568, *5*]	−0.0582 (5) [1.735, *3*]			−0.0611* (3) [2.024, *4*]	−0.0327 (3) [1.424, *4*]	
OF	−0.0407 (6) [1.515, *6*]	−0.1169** (2) [1.756, *6*]	−0.0058 (6) [2.617, *1*]			−0.0715 (4) [1.641, *6*]	−0.0627 (5) [1.972, *3*]			−0.1210* (4) [1.556, *5*]
Staff and service related issues										
RS	−0.0820 (5) [1.636, *4*]			−0.1563** (1) [1.649, *3*]			−0.1821*** (1) [1.844, *5*]		−0.3500*** (1) [1.841, *1*]	−0.2611*** (1) [2.021, *1*]
BS					−0.0844 (4) [1.465, *5*]					
Operations issues										
PW	−0.3670*** (1) [2.078, *2*]	−0.2207*** (1) [2.089, *1*]			−0.1041 (3) [1.620, *4*]			−0.0831** (2) [2.009, *5*]	−0.0090 (4) [1.705, *2*]	−0.0115 (5) [1.688, *4*]
NO	−0.2559*** (3) [1.685, *3*]	−0.0045 (7) [1.897, *4*]			−0.0421 (6) [1.361, *6*]	−0.1638*** (1) [1.718, *5*]	−0.0709 (4) [1.904, *4*]			
SI		−0.1150** (3) [2.042, *2*]				−0.0065 (6) [1.842, *3*]	−0.0424 (6) [1.742, *6*]			
SM			−0.1174*** (2) [2.129, *6*]			−0.1274** (2) [1.938, *1*]	−0.1623*** (3) [2.251, *1*]			
PA				−0.0164 (5) [1.891, *1*]	−0.1334* (1) [1.744, *2*]					
PI								−0.0171 (6) [2.232, *1*]		
AT									−0.0894 (2) [1.441, *3*]	
Reservation and overcharge issues										
RC								−0.0267 (4) [2.190, *2*]		
OI		−0.0538 (5) [1.799, *5*]	−0.0991*** (3) [2.179, *5*]			−0.0166 (5) [1.792, *4*]				
Food issues										
PB	−0.2570*** (2) [2.276, *1*]	−0.0462 (6) [1.577, *7*]	−0.0172 (5) [2.288, *4*]		−0.1133* (2) [1.926, *1*]					−0.1321* (3) [1.843, *2*]

Remark:

(1) *p < 0.01, **p < 0.05, ***p < 0.001.
(2) Standardized coefficients are reported.
(3) Number in () shows the relative importance (in the rank) of each factor mined from the corresponding group of hotels on influencing the customer overall satisfaction. The first number in [] shows the singular value of each factor mined from the corresponding group of hotels online reviews, and the second number (in *italic*) in [] shows the *rank* of singular value of each factor mined from the corresponding group of hotels online reviews.

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hotels of different star levels, hoteliers need to take corresponding actions to serve these targeted customers better. This applies for both the editor-recommended and -nonrecommended hotels. It is beneficial for editor-nonrecommended hotels to improve their products and services to meet the expected criteria and participate in the certification program. This is because certification can enhance the corporate image and more customer demand can be attracted (Heras-Saizarbitoria et al., 2015; Kumar & Balakrishnan, 2011). For editor- recommended hotels, practical actions should be implemented following the certification criteria. All managers and employees should perceive the real needs for products and services with higher quality because of customers' higher expectations toward the editor-recommended hotels (Heras-Saizarbitoria et al., 2015). Customers' needs and expectations should be considered through setting customer-focused targets to improve product and service quality (Martí Bigorra & Isaksson, 2017) and therefore to enhance companies' performance (Abdolvand, Albadvi, & Aghdasi, 2015).

Hoteliers should understand that the pros and cons of the product and service attributes mentioned in online customer reviews may not necessarily influence their overall satisfaction. On the one hand, a more detailed description of certain attributes does not necessarily indicate that customers care about this more than the other attributes; on the other hand, a simple description of a certain attribute cannot be ignored just because it is mentioned concisely. The importance of these attributes for customer satisfaction is not aligned with the level of detail of their description. Hoteliers should consider various factors, such as customers' emotion, motivation, writing style, and demographic information when analyzing online reviews. Viewing and analyzing online customer reviews within a given timeline can help hoteliers test the effects of improvements and the change in customers' perception dynamically (Berezina et al., 2016; Huang, Mesak, Hsu, & Qu, 2012).

Under limited budgets and resources, hotels should give the highest priorities to improve the most important determinants of customer overall satisfaction (Li et al., 2013) according to the importance ranking provided in this study. The attributes mentioned in the online reviews that have a relatively higher importance for customer overall satisfaction should be dealt with at a higher priority level. For positive attributes, hotels should make continuous improvements to raise the quality of these attributes to an even higher level. To amplify the related positive eWOM, hotels can create online discussion forums on hotels' websites, use social media, and build an online quality management system (Guo, Pathak, & Cheng, 2015). These can spread customers' positive feedback to benefit future customer demand and hotels' financial performance (not simply relying on third-party booking sites) (Pan & Zhang, 2011). For negative attributes, hotels should input more resources with high priority to remedy and improve these attributes. Taking prompt and reliable online response management actions are also necessary (Gu & Ye, 2014). These actions include explaining the reasons for service failure to customers online, offering reasonable compensation, and committing to improvement. Online response management and the corresponding improvements of products and services implement service recovery strategies to keep loyal customers and raise their satisfaction (Gu & Ye, 2014; He & Harris, 2014).

7. Conclusions, limitations, and extensions

7.1. Conclusions

Regarding the question of whether customers always say yes or no to higher star level and editor-recommended hotels, the answer is that customers both say yes (through writing positive comments) and no (through writing negative comments) to those hotels. We found that positive and negative textual factors differ, and comparatively, the number of negative textual factors is higher, and their contents are more specific. In addition, for different star level hotels and editor-recommended/nonrecommended hotels, we found that the positive and negative attributes contributing to customer perception differ, and even for the same attribute, its importance level in influencing customer perception differs between different types of hotels. Furthermore, we found an asymmetric effect between the emphasis level of the attributes in online customer reviews and the relative importance of the influence of these certain attributes on customer overall satisfaction, showing the different psychological mechanisms of customers writing online reviews and their overall satisfaction generation.

7.2. Limitations and extensions

The limitations of this study mainly lie in the following aspects. First, the data sample selection process has limitations. The data were collected from hotels in the 100 largest U.S. cities. However, customers' perceptions can differ toward hotels in rural areas and in other countries. Second, customers with different demographics, such as gender, age, nationality, cultural background, and with different travel purposes can have different perception toward hotels (Kashyap & Bojanic, 2000; Nath, Devlin, & Reid, 2018). This study did not differentiate between customers because of the anonymity of the reviews they posted. Third, the price information for each night of customers' hotel stay is not available in this study. Although higher star level hotels generally charge higher prices than lower star level hotels, it is still possible that some lower star level hotels in better locations charge more than higher star level hotels in other locations, which raises customer expectations.

Future studies can address the limitations by collecting more data from online customer reviews of hotels all over the world, and identifying and comparing the perceptions of customers with different demographics and with different shopping/booking behavior and experience (e.g., new versus repeat customers) toward various types of hotels (e.g., resort hotels, conference hotels, full-service versus limited-service hotels; chain versus independent hotels). Future studies can also track the price change of the hotels dynamically and find the influence of price on customer expectations and perceptions of hotel products and services.

In addition, further studies can also extend the current study from the following aspects. First, future studies can examine changes in customer perception within a timeline. Analyzing customers' online reviews in different time periods can identify changes in the factors of online customer reviews and the determinants of customer satisfaction over time, which can show the changes in customer perception of the perceived quality of hotel products and services along with improvements from the hotels' actions dynamically. Future studies can also examine the influence of managers' online responses to customer reviews on the change in customer perceptions. Second, more comparative studies can follow. A comparative study of customer perceptions toward hotels before and after special events, such as managers' online responses and commitment, hotel renovation, or organizational structure change may be interesting. In addition, a comparative study examining customer online textual reviews posted on different platforms, such as social media versus booking/shopping websites could be meaningful. Examining and comparing the contents and linguistic style of online reviews written by customers having different consumption emotion can also be interesting. How the previous customers' online reviews influence future customer expectations and consumption perceptions can also be examined. Last, text mining customer perception toward hotels with excellent customer ratings can set a benchmark for other hotels to follow and improve their product and service attributes. The priority of resource allocation and improvement actions toward certain attributes based on the importance of the determinants of customer satisfaction can be further discussed to more efficiently enhance customer satisfaction under a limited budget and resources.

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References

Abdolvand, N., Albadvi, A., & Aghdasi, M. (2015). Performance management using a value-based customer-centered model. *International Journal of Production Research, 53*(18), 5472–5483.

Aijzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179–211.

Aijzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NY: Prentice-Hall.

Anderson, E. W., Fornell, C., & Lehmann, D. R. (1994). Customer satisfaction, market share, and profitability: Findings from Sweden. *Journal of Marketing, 58*(3), 53–66.

Babin, B. J., & Griffin, M. (1998). The nature of satisfaction: An updated examination and analysis. *Journal of Business Research, 41*(2), 127–136.

Baker, K. (2005). Singular value decomposition tutorial. https://www.ling.ohio-state.edu/~kbaker/pubs/Singular_Value_Decomposition_Tutorial.pdf, Accessed date: 3 February 2016.

Berezina, K., Bilgihan, A., Cobanoglu, C., & Okumus, F. (2016). Understanding satisfied and dissatisfied hotel customers: Text mining of online hotel reviews. *Journal of Hospitality Marketing & Management, 25*(1), 1–24.

Bitner, M. J. (1990). Evaluating service encounters: The effects of physical surroundings and employee responses. *Journal of Marketing,* 69–82.

Bitner, M. J., & Hubbert, A. R. (1994). Encounter satisfaction versus overall satisfaction versus quality. In R. T. Rust, & R. L. Oliver (Eds.). *Service quality: New directions in theory and practice* (pp. 72–94). Thousand Oaks, CA: Sage.

Bolton, R. N., & Drew, J. H. (1991). A multistage model of customers' assessments of service quality and value. *Journal of Consumer Research, 17*(4), 375–384.

Boulding, W., Kalra, A., Staelin, R., & Zeithaml, V. A. (1993). A dynamic process model of service quality: From expectations to behavioral intentions. *Journal of Marketing Research, 30*(February), 7–27.

Bowen, D., & Clarke, J. (2002). Reflections on tourist satisfaction research: Past, present and future. *Journal of Vacation Marketing, 8*(4), 297–308.

Bronner, F., & De Hoog, R. (2011). Vacationers and eWOM: Who posts, and why, where, and what? *Journal of Travel Research, 50*(1), 15–26.

Cantallops, A. S., & Salvi, F. (2014). New consumer behavior: A review of research on eWOM and hotels. *International Journal of Hospitality Management, 30*, 41–51.

Casaló, L. V., Flavián, C., Guinalíu, M., & Ekinci, Y. (2015). Do online hotel rating schemes influence booking behaviors? *International Journal of Hospitality Management, 49*, 28–36.

Chen, A., Lu, Y., Gupta, S., & Qi, X. (2014). Can customer satisfaction and dissatisfaction coexist? An issue of telecommunication service in China. *Journal of Information Technology, 29*(3), 237–252.

Chen, A., & Peng, N. (2014). Examining Chinese consumers' luxury hotel staying behavior. *International Journal of Hospitality Management, 39*, 53–56.

Chen, C. M., Yang, H. W., Li, E. Y., & Liu, C. C. (2015). How does hotel pricing influence guest satisfaction by the moderating influence of room occupancy? *International Journal of Hospitality Management, 49*, 136–138.

Chen, Y., & Xie, J. (2005). Third-party product review and firm marketing strategy. *Marketing Science, 24*(2), 218–240.

Cheung, C. M., & Lee, M. K. (2012). What drives consumers to spread electronic word of mouth in online consumer-opinion platforms. *Decision Support Systems, 53*(1), 218–225.

Chou, C. M. (2014). How does manufacturing service perceived value influence customer satisfaction? An investigation of global semiconductor industry. *International Journal of Production Research, 52*(17), 5041–5054.

Chow, C. S. F., & Zhang, L. L. (2008). Measuring consumer satisfaction and dissatisfaction intensities to identify satisfiers and dissatisfiers. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior, 21*, 66–79.

Churchill, G. A., & Surprenant, C. (1982). An investigation into the determinants of customer satisfaction. *Journal of Marketing Research, 19*(4), 491–504.

Day, R. (1977). Toward a process model of consumer satisfaction. In H. Keith Hunt (Ed.). *Conceptualization and measurement of consumer satisfaction and dissatisfaction* (pp. 153–186). Cambridge, MA: Marketing Science Institute (May).

del Bosque, I. R., & San Martín, H. (2008). Tourist satisfaction a cognitive-affective model. *Annals of Tourism Research, 35*(2), 551–573.

Deng, W. J., Yeh, M. L., & Sung, M. L. (2013). A customer satisfaction index model for international tourist hotels: Integrating consumption emotions into the American customer satisfaction index. *International Journal of Hospitality Management, 35*, 133–140.

Evangelopoulos, N. (2011). Citing Taylor: Tracing Taylorism's technical and socio-technical duality through Latent Semantic Analysis. *Journal of Business and Management, 17*(1), 57–74.

Fiorentino, A. (1995). Budget hotels: Not just minor hospitality products. *Tourism Management, 16*(6), 455–462.

Fuller, M. A., Serva, M. A., & Benamati, J. (2007). Seeing is believing: The transitory influence of reputation information on e-commerce trust and decision making. *Decision Sciences, 38*(4), 675–699.

Gelbrich, K., Gäthke, J., & Grégoire, Y. (2016). How a firm's best versus normal customers react to compensation after a service failure. *Journal of Business Research, 69*(10), 4331–4339.

Golub, G. H., & Reinsch, C. (1970). Singular value decomposition and least squares solutions. *Numerische Mathematik, 14*(5), 403–420.

Gu, B., & Ye, Q. (2014). First step in social media: Measuring the influence of online management responses on customer satisfaction. *Production and Operations Management, 23*(4), 570–582.

Guo, H., Pathak, P., & Cheng, H. K. (2015). Estimating social influences from social networking sites—Articulated friendships versus communication interactions. *Decision Sciences, 46*(1), 135–163.

He, H., & Harris, L. (2014). Moral disengagement of hotel guest negative WOM: Moral identity centrality, moral awareness, and anger. *Annals of Tourism Research, 45*, 132–151.

Heim, G. R., & Field, J. M. (2007). Process drivers of e-service quality: Analysis of data from an online rating site. *Journal of Operations Management, 25*(5), 962–984.

Hennig-Thurau, T., Gwinner, K. P., Walsh, G., & Gremler, D. D. (2004). Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the Internet? *Journal of Interactive Marketing, 18*(1), 38–52.

Heo, C. Y., & Hyun, S. S. (2015). Do luxury room amenities affect guests' willingness to pay? *International Journal of Hospitality Management, 46*, 161–168.

Heras-Saizarbitoria, I., Arana, G., & Boiral, O. (2015). Do ISO 9001-certified hotels get a higher customer rating than non-certified ones? *International Journal of Hospitality Management, 51*, 138–146.

Heung, V. C. S., & Lam, T. (2003). Customer complaint behaviour towards hotel restaurant services. *International Journal of Contemporary Hospitality Management, 15*(5), 283–289.

Hosany, S., & Prayag, G. (2013). Patterns of tourists' emotional responses, satisfaction, and intention to recommend. *Journal of Business Research, 66*(6), 730–737.

Hu, N., Bose, I., Koh, N. S., & Liu, L. (2012). Manipulation of online reviews: An analysis of ratings, readability, and sentiments. *Decision Support Systems, 52*(3), 674–684.

Huang, Y., Mesak, H. I., Hsu, M. K., & Qu, H. (2012). Dynamic efficiency assessment of the Chinese hotel industry. *Journal of Business Research, 65*(1), 59–67.

Hunneman, A., Verhoef, P. C., & Sloot, L. M. (2017). The moderating role of shopping trip type in store satisfaction formation. *Journal of Business Research, 78*, 133–142.

Husbands, P., Simon, H., & Ding, C. H. Q. (2001). On the use of the singular value decomposition for text retrieval. *Computational Information Retrieval, 5*, 145–156.

Jani, D., & Han, H. (2014). Personality, satisfaction, image, ambience, and loyalty: Testing their relationships in the hotel industry. *International Journal of Hospitality Management, 37*, 11–20.

Jones, M. A., & Suh, J. (2000). Transaction-specific satisfaction and overall satisfaction: An empirical analysis. *Journal of Services Marketing, 14*(2), 147–159.

Kashyap, R., & Bojanic, D. C. (2000). A structural analysis of value, quality, and price perceptions of business and leisure travelers. *Journal of Travel Research, 39*(1), 45–51.

Kelley, C. A. (1988). An investigation of consumer product warranties as market signals of product reliability. *Journal of the Academy of Marketing Science, 16*(2), 72–78.

Klema, V., & Laub, A. (1980). The singular value decomposition: Its computation and some applications. *IEEE Transactions on Automatic Control, 25*(2), 164–176.

Kotler, A., Brown, A. S., & Armstrong, G. (2003). *Principles of marketing* (2nd ed.). Melbourne: Prentice Hall.

Kucukusta, D., Mak, A., & Chan, X. (2013). Corporate social responsibility practices in four and five-star hotels: Perspectives from Hong Kong visitors. *International Journal of Hospitality Management, 34*, 19–30.

Kulkarni, S. S., Apte, U. M., & Evangelopoulos, N. E. (2014). The use of latent semantic analysis in operations management research. *Decision Sciences, 45*(5), 971–994.

Kumar, D. A., & Balakrishnan, V. (2011). A study on ISO 9001 quality management system certifications – Reasons behind the failure of ISO certified organizations. *Global Journal of Management and Business Research, 11*(9), 43–50.

Lau, K. N., Lee, K. H., & Ho, Y. (2005). Text mining for the hotel industry. *Cornell Hotel and Restaurant Administration Quarterly, 46*(3), 344–362.

Lee, C. C., & Hu, C. (2004). Analyzing hotel customers' E-complaints from an internet complaint forum. *Journal of Travel & Tourism Marketing, 17*(2–3), 167–181.

Lee, M. J., Sing, N., & Chan, E. S. W. (2011). Service failures and recovery actions in the hotel industry: A text-mining approach. *Journal of Vacation Marketing, 17*(3), 197–207.

Levitt, T. (1983). *The marketing imagination.* New York: Free Press.

Li, H., Ye, Q., & Law, R. (2013). Determinants of customer satisfaction in the hotel industry: An application of online review analysis. *Asia Pacific Journal of Tourism Research, 18*(7), 784–802.

Litvin, S. W., Goldsmith, R. E., & Pan, B. (2008). Electronic word-of-mouth in hospitality and tourism management. *Tourism Management, 29*, 458–468.

Liu, M. T., Wong, I. A., Tseng, T. H., Chang, A. W. Y., & Phau, I. (2017). Applying consumer-based brand equity in luxury hotel branding. *Journal of Business Research, 81*, 192–202.

Liu, S., Law, R., Rong, J., Li, G., & Hall, J. (2013). Analyzing changes in hotel customers' expectations by trip mode. *International Journal of Hospitality Management, 34*, 359–371.

Loureiro, S. M. C., & Kastenholz, E. (2011). Corporate reputation, satisfaction, delight, and loyalty towards rural lodging units in Portugal. *International Journal of Hospitality Management, 30*, 575–583.

Manes, E., & Tchetchik, A. (2018). The role of electronic word of mouth in reducing information asymmetry: An empirical investigation of online hotel booking. *Journal of Business Research, 85*, 185–196.

Martí Bigorra, A., & Isaksson, O. (2017). Combining customer needs and the customer's way of using the product to set customer-focused targets in the House of Quality. *International Journal of Production Research, 55*(8), 2320–2335.

Martin, D., & Isozaki, M. (2013). Hotel marketing strategies in turbulent times: Path analysis of strategic decisions. *Journal of Business Research, 66*(9), 1544–1549.

Matzler, K., & Sauerwein, E. (2002). The factor structure of customer satisfaction: An empirical test of the importance grid and the penalty-reward-contrast analysis. *International Journal of Service Industry Management, 13*(4), 314–332.

Mauri, A. G., & Minazzi, R. (2013). Web reviews influence on expectations and purchasing intentions of hotel potential customers. *International Journal of Hospitality Management, 34*, 99–107.

Maxham, J. G., III (2001). Service recovery's influence on consumer satisfaction, positive

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word-of-mouth, and purchase intentions. *Journal of Business Research, 54*(1), 11–24.
Mittal, V., Ross, W. T., & Baldasare, P. M. (1998). The asymmetric impact of negative and positive attribute-level performance on overall satisfaction and repurchase intentions. *Journal of Marketing, 62*(1), 33–47.
Nash, R., Thyne, M., & Davies, S. (2006). An investigation into customer satisfaction levels in the budget accommodation sector in Scotland: A case study of backpacker tourists and the Scottish Youth Hostels Association. *Tourism Management, 27*, 525–532.
Nath, P., Devlin, J., & Reid, V. (2018). The effects of online reviews on service expectations: Do cultural value orientations matter? *Journal of Business Research, 90*, 123–133.
Ngo-Ye, T. L., & Sinha, A. P. (2014). The influence of reviewer engagement characteristics on online review helpfulness: A text regression model. *Decision Support Systems, 61*, 47–58.
Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17*, 460–469.
Pan, Y., & Zhang, J. Q. (2011). Born unequal: A study of the helpfulness of user-generated product reviews. *Journal of Retailing, 87*(4), 598–612.
Pang, G., Casalin, F., Papagiannidis, S., Muyldermans, L., & Tse, Y. K. (2015). Price determinants for remanufactured electronic products: A case study on eBay UK. *International Journal of Production Research, 53*(2), 572–589.
Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). Servqual: A multiple-item scale for measuring consumer perception of service quality. *Journal of Retailing, 64*(1), 12–40.
Park, I., Cho, J., & Rao, H. R. (2015). The dynamics of pre- and post- purchase service and consumer evaluation of online retailers: A comparative analysis of dissonance and disconfirmation models. *Decision Sciences, 46*(6), 1109–1140.
Park, S., & Nicolau, J. L. (2015). Asymmetric effects of online consumer reviews. *Annals of Tourism Research, 50*, 67–83.
Parsa, H. G., & Cobanoglu, C. (2011). Building a model of commitment for Generation Y: An empirical study on e-travel retailers. *Tourism Management, 32*(4), 833–843.
Peng, J., Zhao, X., & Mattila, A. S. (2015). Improving service management in budget hotels. *International Journal of Hospitality Management, 49*, 139–148.
Priest, G. L. (1981). A theory of the consumer product warranty. *The Yale Law Journal, 90*(6), 1297–1352.
Ren, L., Qiu, H., Wang, P., & Lin, P. M. C. (2016). Exploring customer experience with budget hotels: Dimensionality and satisfaction. *International Journal of Hospitality Management, 52*, 13–23.
San Martín, H., & del Bosque, I. A. R. (2008). Exploring the cognitive-affective nature of destination image and the role of psychological factors in its formation. *Tourism Management, 29*(2), 263–277.
Schuckert, M., Liu, S., & Law, R. (2015). A segmentation of online reviews by language groups: How English and non-English speakers rate hotels differently. *International Journal of Hospitality Management, 48*, 143–149.
Sidorova, A., Evangelopoulos, N., Valacich, J. S., & Ramakrishnan, T. (2008). Uncovering the intellectual core of the information systems discipline. *MIS Quarterly, 32*(3), 467–482.
Sirohi, N., McLaughlin, E. W., & Wittink, D. R. (1998). A model of consumer perceptions and store loyalty intentions for a supermarket retailer. *Journal of Retailing, 74*(2), 223–245.
Slevitch, L., & Oh, H. (2010). Asymmetric relationship between attribute performance and customer satisfaction: A new perspective. *International Journal of Hospitality Management, 29*(4), 559–569.
Smith, C. A., Haynes, K. N., Lazarus, R. S., & Pope, L. K. (1993). In search of the "hot" cognitions: Attributions, appraisals, and their relation to emotion. *Journal of Personality and Social Psychology, 65*(5), 916–929.
Srinivasan, S. S., Anderson, R., & Ponnavolu, K. (2002). Customer loyalty in e-commerce: An exploration of its antecedents and consequences. *Journal of Retailing, 78*(1), 41–50.
Stein, N. L., & Oatley, K. (1992). Basic emotions: Theory and measurement. *Cognition & Emotion, 6*(3–4), 161–168.
Su, A. Y. (2004). Customer satisfaction measurement practice in Taiwan hotels. *International Journal of Hospitality Management, 23*, 397–408.
Teas, R. K. (1993). Expectations, performance evaluation, and consumers' perceptions of quality. *The Journal of Marketing, 57*(4), 18–34.
Torres, E. N., Singh, D., & Robertson-Ring, A. (2015). Consumer reviews and the creation of booking transaction value: Lessons from the hotel industry. *International Journal of Hospitality Management, 50*, 77–83.
Ullah, R., Amblee, N., Kim, W., & Lee, H. (2016). From valence to emotions: Exploring the distribution of emotions in online product reviews. *Decision Support Systems, 81*, 41–53.
US Census Bureau, Population Division (2015). Table 1: Annual estimates of the resident population for incorporated places of 50,000 or more, ranked by July 1, 2014 population: April 1, 2010 to July 1, 2014 - United States — Places of 50,000+ population. 2014 population estimates. Retrieved from https://factfinder.census.gov/faces/nav/jsf/pages/download_center.xhtml.
Westbrook, R. A. (1980). Intrapersonal affective influences on consumer satisfaction with products. *Journal of Consumer Research, 7*(1), 49–54.
Westbrook, R. A., & Oliver, R. L. (1991). The dimensionality of consumption emotion patterns and consumer satisfaction. *Journal of Consumer Research, 18*(1), 84–91.
Xiang, Z., Schwartz, Z., Gerdes, J. H. J., & Uysal, M. (2015). What can big data and text analytics tell us about hotel guest experience and satisfaction? *International Journal of Hospitality Management, 44*, 120–130.
Xie, K. L., Zhang, Z., & Zhang, Z. (2014). The business value of online consumer reviews and management response to hotel performance. *International Journal of Hospitality Management, 43*, 1–12.
Xu, X. (2018). Examining the relevance of online customer textual reviews on hotels' product and service attributes. *Journal of Hospitality and Tourism Research*. https://doi.org/10.1177/1096348018764573 (ahead of print).
Xu, X., & Gursoy, D. (2015a). A conceptual framework of sustainable hospitality supply chain management. *Journal of Hospitality Marketing and Management, 24*, 229–259.
Xu, X., & Gursoy, D. (2015b). Influence of sustainable hospitality supply chain management on customers' attitudes and behaviors. *International Journal of Hospitality Management, 49*, 105–116.
Xu, X., & Li, Y. (2016). The antecedents of customer satisfaction and dissatisfaction toward various types of hotels: A text mining approach. *International Journal of Hospitality Management, 55*, 57–69.
Yang, W., & Mattila, A. S. (2012). The role of tie strength on customer dissatisfaction responses. *International Journal of Hospitality Management, 31*, 399–404.
Yen, C. L., & Tang, C. H. (2015). Hotel attribute performance, eWOM motivations, and media choice. *International Journal of Hospitality Management, 46*, 79–88.
Zeithaml, V. A., Bitner, M. J., & Gremler, D. D. (2006). *Service marketing.* Boston: McGraw-Hill.
Zhang, Z., Ye, Q., Law, R., & Li, Y. (2010). The impact of e-word-of-mouth on the online popularity of restaurants: A comparison of consumer reviews and editor reviews. *International Journal of Hospitality Management, 29*(4), 694–700.
Zhou, L. Q., Ye, S., Pearce, P., & Wu, M. Y. (2014). Refreshing hotel satisfaction studies by reconfiguring customer review data. *International Journal of Hospitality Management, 38*, 1–10.

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