

# EXAMINING THE RELEVANCE OF ONLINE CUSTOMER TEXTUAL REVIEWS ON HOTELS' PRODUCT AND SERVICE ATTRIBUTES

Xun Xu

California State University, Stanislaus

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*Online reviews left by guests have business value in terms of understanding customers' perceptions of hotels' product and service attributes. By focusing on customers' textual reviews through a text-mining approach (specifically, latent semantic analysis) and statistical tests, this study examined and compared the relevance of core attributes with customer satisfaction and dissatisfaction for both chain and independent hotels of various star levels. We found that the attributes of products and services—including staff, physical setting, value, and location—have different effects on customer satisfaction or dissatisfaction for chain and independent hotels, and for hotels with different star levels. Based on these findings, we concluded that a given hotel's status as either an independent or a chain establishment and its star-level play a role in influencing the importance of product and service attributes for customers. Our study helped hotels in different market segments understand customers' different needs as they relate to each attribute of the hotel's products and services. Hoteliers can use this information to set priority rules for improving the corresponding attributes and use the generated electronic word-of-mouth effect from online customer reviews to enhance their performance.*

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**KEYWORDS:** *online customer reviews; customer satisfaction; products and services attributes; text mining*

## INTRODUCTION

In the e-commerce era, many customers post online reviews of products and services after consumption. These online reviews generate the electronic word-of-mouth (eWOM) effect to influence future customer purchase decisions and therefore have significant business value (Book, Tanford, Montgomery, & Love, 2015).

Online customer reviews contain rich information. Online customer ratings are often considered an indication of overall customer satisfaction and have been discussed by many studies (e.g., Kim, Li, & Brymer, 2016). Compared with online ratings, which have been examined in many previous studies (e.g., Schuckert, Liu, & Law, 2015), online customer textual reviews contain more information about the customer's consumption experience and perception due to their open structure (Berezina, Bilgihan, Cobanoglu, & Okumus, 2016). Therefore, as a burgeoning study field, online customer textual reviews are attracting more and more attention from researchers and practitioners (e.g., Xiang, Schwartz, Gerdes, & Uysal, 2015; Xu & Li, 2016).

Knowledge sharing through online reviews is important for the specific context of hospitality management for several reasons. First, knowledge sharing is important for customers. Online reviews contain much knowledge about customers' evaluation of the attributes of products and services offered by hotels, which generates the eWOM effect, influencing future customers' trust, booking intentions, and demand (Cantallops & Salvi, 2014). Second, knowledge sharing is important to hoteliers. The pros and cons mentioned in customer reviews can provide a guideline for hotels to maintain their strengths and improve their weaknesses. Hoteliers can provide managerial online responses to customers as a service recovery strategy to commit to improving service or to provide compensation to dissatisfied customers (B. Gu & Ye, 2014). Thus, examining online customer reviews has significant business value in hospitality management.

Although customer satisfaction has been examined from the perspective of online reviews (e.g., Xiang et al., 2015), research gaps still exist. The contributions of this study are both theoretical and methodological. Theoretically, most of the previous research studying online customer reviews has treated hotels as a homogenous group and discussed customer satisfaction with the hotels (e.g., Berezina et al., 2016; Xiang et al., 2015). But customers' perceptions are influenced by many factors, such as perceived quality of products and services and expectations, and these factors are dependent on the type of business. This study is one of the first to examine and compare customer satisfaction/dissatisfaction with various attributes of products and services of hotels of different types—chain/independent hotels and those with different star levels—by using online reviews. The comparisons are based on three dimensions. Correspondingly, this study has three research questions. First, we aimed to examine and compare whether there was a difference between chain and independent hotels in the product and service attributes contributing to customer satisfaction/dissatisfaction. Chain hotels and independent hotels have different operating strategies and efficiency (Botti, Bricc, & Cliquet, 2009). Answering this research question can help new hotels make franchise decisions and understand the impact of chain/independent hotels' images and operations on customers' perceptions. Second, we aimed to examine and compare whether there was a difference among hotels with different star levels in the product and service attributes contributing to customer satisfaction/dissatisfaction. Hotels with different star levels target

different customers, charge different room rates, and provide different service qualities. Examining customer satisfaction and dissatisfaction with hotels with different star levels can help us better understand customer needs for each star-level and the perceived value and utility of the product and service attributes when considering the costs (room rate), thus helping hotels set priorities for the attributes that are most important to customers and improve cost performance. Third, we aimed to examine and compare the attributes that incur customer satisfaction and dissatisfaction. This reveals customers' mixed feelings of satisfaction and dissatisfaction at the attributes level. Customers can be satisfied with certain attributes but dissatisfied with others. Hotels can use the findings as a guideline to maintain the positive attributes and improve the negative attributes to enhance customers' overall perceptions (Duverger, 2012).

Methodologically, this study bridged two categories of previous studies discussing online customer reviews: studies focusing on the writing style of online reviews (the technical side, e.g., Salehan & Kim, 2016) and studies focusing on customer perceptions from online reviews (the content side, e.g., Xiang et al., 2015). To this end, we examined customer satisfaction and dissatisfaction through the relevance of positive/negative online customer textual reviews regarding each attribute of products and services. Relevance in this study was measured by the proportion of textual review words describing a certain product or service attribute. For example, if the textual review has 50 words, and 40 describe the staff's attitude and behavior, then this textual review gives great relevance to the staff attribute. Relevance shows customer satisfaction or dissatisfaction regarding a certain attribute of the products and services. Although text-mining techniques, such as content analysis (Li, Ye, & Law, 2013), text-link analysis (Berezina et al., 2016), and latent semantic analysis (LSA; Xu & Li, 2016), are used in analyzing online customer textual reviews, these methods are mainly used to obtain descriptive statistics such as word frequency. This study extended Xu and Li's (2016) research by incorporating statistical tests into LSA to reveal the relevance customers give to each core attribute of hotels' products and services offered by chain/independent hotels and those with different star levels. LSA can efficiently extract and represent the textual factors from online customer textual reviews.

## **THEORETICAL BACKGROUND AND LITERATURE REVIEW**

### **Theoretical Background**

After staying in hotel rooms, customers compare their expectations before the stay experience with their actual perceptions. According to the expectation–disconfirmation theory, customers are satisfied if the perceived quality of products and services meets or exceeds their expectations. Otherwise, customers are dissatisfied (Churchill & Surprenant, 1982). The contents of positive online customer reviews show the sources of their satisfaction, and the contents of negative reviews show the sources of their dissatisfaction.

Hotels' products and services have many attributes. According to utility theory (Lancaster, 1971), customers purchase bundles of attributes, which together represent the products and services with a certain level of quality that are offered by a company at a certain level of price to obtain utility. Hotel guests pay certain room rates to buy the various attributes offered by hotel products and services to obtain the utility. Utility is related to customers' perceived value of the attributes of product and services, and it influences customers' levels of satisfaction and dissatisfaction (Anderson, 1998).

According to multiattribute theory, various attributes have different influence extents on customers' perceptions (Aijzen, 1991). The influence extent depends on both the independent customer's focus (Heo & Hyun, 2015) and the properties of the attributes, such as core attributes or incidental attributes (Xiang et al., 2015). This gives customer reviews different relevance to each attribute of the products and services.

Prospect theory (Kahneman & Tversky, 1979) is a descriptive theory that describes the way people make decisions between alternatives based on the potential value of gains and losses. It indicates that customers' evaluations of their consumption experiences are more highly influenced by the negative attributes compared with the positive attributes (i.e., loss aversion) and depends on their point of reference (i.e., reference dependence; Einhorn & Hogarth, 1981). Based on prospect theory, Mittal, Ross, and Baldasare (1998) found that, compared with positive performance, negative performance on attributes has greater impact on overall customer satisfaction, and overall satisfaction has a diminishing sensitivity to attribute-level performance. The marginal effect of an attribute level on overall satisfaction tends to decrease. Our study is based on prospect theory and follows Mittal et al.'s (1998) findings differentiating the positive and negative attributes and their different roles in overall customer satisfaction. Customers evaluate products and services at the attribute level; thus, they can be satisfied with certain attributes but dissatisfied with other attributes of the product or service.

Our study contributed to Mittal et al.'s (1998) study by extending it to examine the roles of different types of businesses (i.e., hotels) in influencing customers' perceptions. The particular types we examined in this study include chain/independent hotels and different star levels (budget, midlevel, and luxury) of hotels. Such groupings reveal the effect of different operating strategies and pricing on customers' perceptions. In detail, this study focused on examining and comparing customer satisfaction/dissatisfaction with the various attributes of products and services offered by different types of hotels.

The types of the hotels (e.g., chain vs. independent hotels, star levels) can be observed on their websites by customers, which serves as a marketing signal. Signaling theory describes how the seller credibly conveys some information about itself using a signal to buyers (Connelly, Certo, Ireland, & Reutzel, 2011). The information shows the seller has a greater ability to provide high-quality products and services (Ghose, 2009). Therefore, during the prepurchase period,

the signal alleviates customers' uncertainty, enhances familiarity, and influences customers' expectations about the seller and the products, especially in the online purchase/booking environment (Dimoka, Hong, & Pavlou, 2012). These signals influence customers' perceptions of the benefits associated with obtaining the product and service (e.g., valence of experience) and, together with customer perceptions of online booking websites and trust in customer reviews, influence customers' perceptions of hotels' utilitarian and hedonic values and affect online purchasing/booking decisions (Y. K. Lee, Kim, Chung, Ahn, & Lee, 2016). This shows that online customer reviews, having a social media function, also have significant social commerce value (Y. K. Lee et al., 2016). Different types of hotels have different operating strategies, offer different types of products and services with different quality levels of attributes, and charge different room rates, all of which influence customers' postpurchase perceptions, namely their overall satisfaction.

### **Examining Customer Perception Toward Hotels Through Online Reviews**

With well-developed information technology in the e-commerce era, more customers posted online reviews after their hotel stays, generating eWOM—a phenomenon that has attracted more attention in recent studies (e.g., Book et al., 2015; C. H. Lee & Cranage, 2014; Sparks & Bradley, 2017; Ye, Li, Wang, & Law, 2014). Both customer ratings and textual comments have been studied (e.g., Schuckert et al., 2015; Xiang et al., 2015). Compared with online customer ratings, the study of online textual reviews is a burgeoning field (Berezina et al., 2016). Online customer textual reviews contain rich information about customers' consumption experiences, which reflects their perceptions of the detailed attributes of product and service quality (Xu & Li, 2016). However, due to their open structure, extensive content, and the substantial number of online reviews posted, online textual review study is complex (Xiang et al., 2015).

In the few studies focusing on online textual reviews, customer satisfaction and dissatisfaction toward hotels have been examined using textual reviews (e.g., Berezina et al., 2016). However, most studies have not differentiated customers' perceptions of specific types of hotels. Xu and Li's (2016) work was among the very few papers focusing on customers' perceptions of certain types of hotels: full-service hotels, limited-service hotels, suite hotels with food and beverages, and suite hotels without food and beverages, from online reviews.

To explore customers' perceptions from online textual reviews, researchers most often use frequency analysis (Xiang et al., 2015) and content analysis (Li et al., 2013). However, these two methodologies require researchers to read the online textual reviews word by word and therefore may not be convenient, or may even be infeasible, in the big-data era. Our study applied LSA, as used in Xu and Li's (2016) study, to deal with big data by automatically extracting and representing human language through coding (Kulkarni, Apte, & Evangelopoulos,

2014). This method (LSA) is more objective than manual analysis because of its mathematical essence and therefore can efficiently avoid researcher bias (Kulkarni et al., 2014).

### HYPOTHESES DEVELOPMENT

The hotel industry can be characterized by a dichotomy between chain and independent hotels. The main difference between chain and independent hotels is the organizational relationship of hotels; chain hotels are affiliated with other hotels under common ownership, whereas independent hotels have independent operations (Ottenbacher, Shaw, & Lockwood, 2006). A chain hotel is a hotel that is part of a group of hotels under the brand of a hotel group—an administration company that manages a number of hotels having different locations but using the same name or brand. Our definition of “chain-affiliated” hotels includes both wholly owned subsidiaries and franchises. The opposite of the chain hotels are independent hotels, which operate independently (O’Neill & Carlbäck, 2011).

Customers can have differing perceptions about their stay experiences in chain and independent hotels for two main reasons. The first reason derives from the characteristics of the hotel itself. Chain hotels take advantage of the brand effect and can utilize the chain’s strengths, such as economies of scale, to gain cost advantages and access techniques of revenue management, various resources, and marketing channels through global advertising and networks for reservations and referrals (Yeung & Law, 2004). Independent hotels operate independently and usually are smaller, with fewer resources and less hierarchical management systems than chain hotels (Ottenbacher et al., 2006). According to the resource constraint theory (O’Neill & Carlbäck, 2011), the smaller ownership structure and lack of brand affiliation result in independent hotels having less access to resources, and this lack of resources usually engenders poor performance (Yang & Mao, 2017).

The second reason for customers’ differing perceptions of chain and independent hotels relates to the customers. Customers usually are more familiar with chain hotels than with independent hotels because of the chain hotels’ brand effect. Brand extension theory provides a theoretical basis for understanding the impact of branding on customer perception and behavioral intention (Dickinson & Barker, 2007). Customers’ familiarity with a hotel’s brand affects their evaluation of a given hotel (Kwun, 2010). In addition, when customers have higher familiarity with a hotel, their knowledge about that brand’s hotels is likely to increase because it is easier for them to develop a knowledge structure or recall the information about a familiar brand (Kwun, 2010). According to the expected utility theory, customers’ enhanced knowledge increases the perceived value to them of a hotel’s products and services (Wang & Hazen, 2016). Furthermore, the differing levels of familiarity influence customers’ expectations regarding those products and services; according to the expectation–disconfirmation theory, the

differing expectations influence whether customers are satisfied or dissatisfied (Churchill & Surprenant, 1982).

Chain and independent hotels have different operating efficiencies (Botti et al., 2009). Compared with independent hotels, chain hotels perform better on certain attributes such as employee training and technology application (Yeung & Law, 2004). Independent hotels' standards of products and services are more varied than those of chain hotels (Haktanir & Harris, 2005).

Travelers are generally more familiar with chain hotels compared with independent hotels due to the chain's brand, and therefore tend to show higher loyalty to chain hotels by frequently visiting them (Kandampully & Suhartanto, 2003). This familiarity influences predictive expectations and the perceived performance of hotels and therefore influences disconfirmation and customer satisfaction (Tam, 2008).

As eWOM, online customer reviews show customers' loyalty intentions or complaints (Cantallops & Salvi, 2014) and give recommendations or warnings about customers' future purchases, aiming to provide helpfulness information (Salehan & Kim, 2016). Therefore, the attributes of products and services mentioned in online customer reviews are different between chain and independent hotels. Based on the preceding discussion, this study proposed the following hypotheses:

**Null Hypothesis 1a (1b):** There is no difference between chain and independent hotels in the product and service attributes contributing to customer satisfaction (dissatisfaction).

**Alternative Hypothesis 1a (1b):** There is a difference between chain and independent hotels in the product and service attributes contributing to customer satisfaction (dissatisfaction).

Different star-level hotels (i.e., budget hotels, midlevel hotels, and luxury hotels) have different business strategies (Ren, Qiu, Wang, & Lin, 2016). Budget hotels focus on providing good value for the money by offering standardized accommodation, limited services, and cheaper room rates as compared with upgraded hotels (Gilbert & Lockwood, 1990). Luxury hotels focus on providing customers additive pleasure and comfort with premium products and services (Heo & Hyun, 2015). Midlevel hotels are in the midrange of functionality and price.

Price influences customer satisfaction (Bojanic, 1996). Hotels with higher star levels generally have higher room rates. Both higher star levels and price increase customer expectations (Choi & Mattila, 2004). According to the expectation–disconfirmation theory (Oliver, 1980), variations in product and service performance and customer expectations lead to variations in customer satisfaction among different types of hotels.

Different types of hotels also implement different actions and strategies of customer relationship management (Ye, Law, Gu, & Chen, 2011). Online hotel



management, which includes providing responses to online customer reviews and compensation and commitment to change when service failure occurs, influences future customers' online booking intentions and reviews (B. Gu & Ye, 2014). Therefore, all the above factors influence the relevance of online customer textual reviews to each attribute of products and services. Based on the preceding discussion, this study proposed the following hypotheses:

**Null Hypothesis 2a (2b):** At each star-level of hotels, there is no difference between chain hotels and independent hotels in the product and service attributes contributing to customer satisfaction (dissatisfaction).

**Alternative Hypothesis 2a (2b):** At each star-level of hotels, there is a difference between chain hotels and independent hotels in the product and service attributes contributing to customer satisfaction (dissatisfaction).

Expectation–disconfirmation theory explains both customer satisfaction- and dissatisfaction-generating mechanisms (Oliver, 1980); however, studies have found customer satisfaction and dissatisfaction use different scales (e.g., Chen, Lu, Gupta, & Qi, 2014). The coexistence of customer satisfaction and dissatisfaction shows that customers can be satisfied with certain attributes of products and services and dissatisfied with others (Zhou, Ye, Pearce, & Wu, 2014). A lack of or low performance regarding some attributes can cause customer satisfaction, whereas high performance may not necessarily raise customer satisfaction (H. Gu & Ryan, 2008).

Positive and negative textual reviews are the results of different customer perceptions and therefore have different purposes. Customer satisfaction stimulates customers to post positive online textual reviews to share their experiences and recommend the service or product to future customers (Xiang et al., 2015). Customer dissatisfaction stimulates customers to post negative online textual reviews, which are one of the channels in which customers lodge complaints or warn future customers (C. C. Lee & Hu, 2004). Based on the preceding discussion, this study proposed the following hypotheses:

**Null Hypothesis 3:** There is no difference between the product and service attributes contributing to customer *satisfaction* and *dissatisfaction* with chain and independent hotels.

**Alternative Hypothesis 3:** There is a difference between the product and service attributes contributing to customer *satisfaction* and *dissatisfaction* with chain and independent hotels.

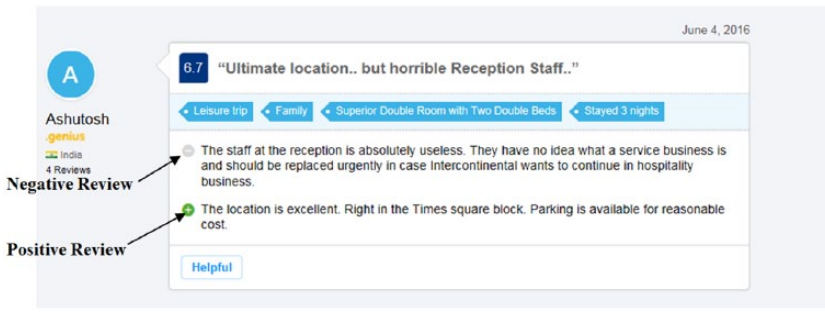
## DATA

### Data Collection

We collected data of customer reviews from a popular hotel booking website: booking.com. The website allows only customers who have stayed at hotels



**Figure 1**  
**Screenshot of Online Customer Textual Review Sample on Booking.com**

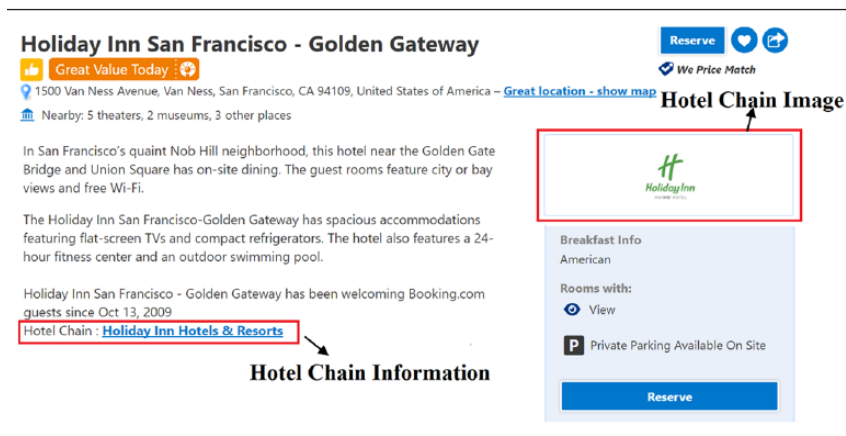


booked through booking.com to post reviews. This ensured the validity of the online review data. The advantage of choosing this online booking website is that it asks customers to post their positive and negative evaluations separately as text, as can be seen in Figure 1. This allowed us to examine the determinants of customer satisfaction and dissatisfaction separately.

There are two main reasons why it is relatively easy for customers to determine the type of hotel (i.e., chain vs. independent). First, as shown in Figure 2, booking.com's description for each hotel follows a standard structure, noting the status of each hotel as a chain or independent establishment at the bottom of the description, on a separate line. The name of the hotel chain is shown, along with a link that allows customers to easily search for additional locations for that particular chain. In addition, the chain's brand image is shown on the webpage. Second, on booking.com, information about a given hotel's status as a chain or an independent hotel is shown on the hotel's reservation page. Thus, customers are virtually guaranteed to see this information when making their reservations. We categorized all the hotels in our study into two groups—chain hotels and independent hotels according to the chain/independent hotel information shown on booking.com—and coded them accordingly.

Referring to Xiang et al.'s (2015) study, we collected online customer reviews from 600 hotels in the 100 largest cities in the United States (U.S. Census Bureau, 2015). For each hotel, we generated 7 different random numbers from 1 to 30 as indices and collected the review data with the corresponding indices as they appeared in the review's rank of sequence as posted on the hotel website. We then excluded samples that did not have any text entry on either pros, cons, or both, which resulted in 3,601 reviews, including 774 reviews (21.49%) from two-star or below chain hotels, 331 reviews from two-star or below independent hotels (9.19%), 1,404 reviews (38.99%) from three-star chain hotels, 468 reviews from three-star independent hotels (13.00%), 402 reviews (11.16%) from four- or five-star chain hotels, and 222 reviews (6.17%) from four- or five-star independent hotels. The two-star or below, three-star, and four- or five-star

**Figure 2**  
**Screenshot of Hotel Chain Information Found on Booking.com**



hotels can be considered budget or economy hotels, midlevel hotels, and luxury hotels, respectively (Heo & Hyun, 2015; Ren et al., 2016).

## Data Analysis

Information-overloading issues are common in the e-commerce era. We used text-mining approaches, particularly LSA, in this study to analyze online customer textual reviews to overcome the information-overloading issues caused by the open structure and large number of words in the online textual reviews. LSA is a mathematical tool that can find the underlying topical structure of textual data and efficiently represent and extract underlying meanings from human language. The use of LSA has been attracting attention in business studies (Kulkarni et al., 2014).

There were three main steps of using LSA in this study. In the first step, we conducted preprocessing and term reduction. We used the software RapidMiner Studio to treat the textual data. First, all the words that did not have virtual meaning, such as trivial words and stop words (e.g., an, and, the) were removed. Second, because text mining deals with the main themes from the texts, all words appearing only once were removed. Third, the words' roots were identified to ensure the same meaning from the same root. For example, although "coordination," "coordinating," and "coordinate" are different words, they have the same root and meaning and thus are considered the same in text mining. Last, we added an  $n$ -gram algorithm. Helpful for natural language processing tasks (Tan, Wang, & Lee, 2002),  $n$ -gram algorithms focus on phrase patterns and can identify repeated phrases containing words fewer than or equal to  $n$ . Technically,  $n$ -gram uses vector presentations and keeps the semantic information in the same dimensionality (Lebret & Collobert, 2014). In our study, we

used a 3-gram algorithm and thus identified repeated phrases containing fewer than or equal to 3 words, such as “complain\_front\_desk,” “hotel\_hard\_get,” and “nice\_bed.”

Then, for the second step, we conducted term frequency matrix transformation. Referring to Husbands, Simon, and Ding (2001), we calculated term frequency in all documents and used the term *frequency-inverse document frequency* (TF-IDF) weighting method to convert these frequency values in the matrices. Frequency-inverse document frequency is a widely used term-weighting method in natural language processing that puts more weight on rare terms and discounts the weight of common terms (Kulkarni et al., 2014). In this study, technically, the term frequency ( $tf_{i,j}$ ) was calculated by  $tf_{i,j} = \frac{n_{i,j}}{n_j}$ , where  $n_{i,j}$  is the number of occurrences of token  $i$  in document  $j$ , and  $n_j$  is the total number of tokens in document  $j$ . The inverse document frequency ( $idf_i$ ) was calculated by  $idf_i = \log\left(\frac{N}{df_i}\right)$ , where  $N$  is the number of documents in the database and  $df_i$  is the frequency of documents that have the token  $i$ . The weights  $w_{i,j}$  contained in the transformed term-document matrix were calculated by  $w_{i,j} = tf_{i,j} \times idf_i$ .

The last step was singular value decomposition. The term-by-factor matrix, the singular-value matrix, and the document-by-factor matrix were generated in this step. The term-by-factor matrix showed the extent to which a term loads on a specific factor. The singular-value matrix presented the eigenvalues. The document-by-factor matrix showed the extent to which a document loads on a specific factor.

The mechanism of LSA results interpretation can be referred to as exploratory factor analysis (EFA), where LSA mainly deals with textual data and EFA mainly deals with numerical data. We interpreted each factor according to its high-loading terms and documents.

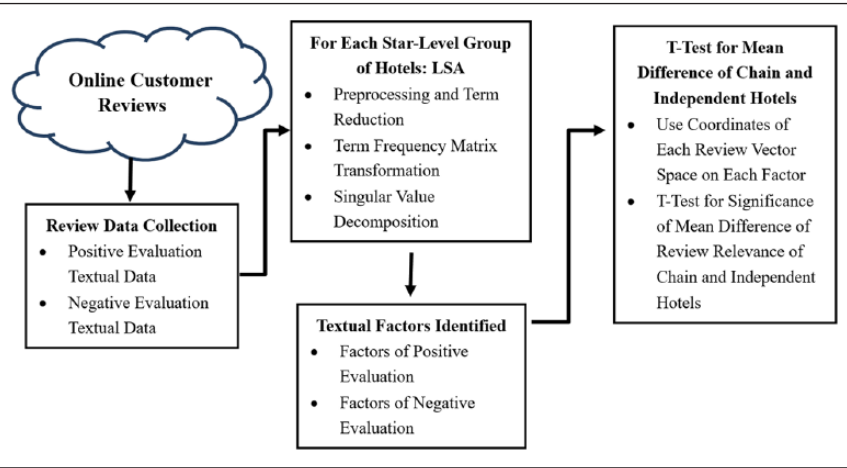
For each of the positive and negative factors in each star-level group of hotels, we conducted a  $t$  test using the vector space (Ngo-Ye & Sinha, 2014). We used the coordinates of each review vector space on each factor and calculated the mean of the coordinates of the chain and independent hotels separately for each factor. Through the  $t$  test, we could find the significance of the textual coordinate mean difference of chain and independent hotels on each factor, which showed the relevance of the text on the factor. The methodology of text mining is summarized in Figure 3.

## RESULTS

### Factors Leading to Customer Satisfaction With Various Star-Level Groups of Hotels

Using the conceptual framework of Zhou et al.'s (2014) study about the determinants of customer satisfaction and dissatisfaction with hotels, and

Figure 3  
Data Analysis of This Study



according to the EFA results obtained from LSA, four main factors, including friendly staff, good physical setting (including room, hotel, and food), good location, and good value, were identified for each star group of hotels (except that the five-star hotels do not have the good value factor). The influential factors that determined customer satisfaction from customer reviews for each star group of hotels are summarized in Table 1. We presented the top 10 terms (referring to loading) corresponding to each factor in Table 1. All the factors listed in Table 1 cover more than 95% of unique terms, which shows these factors can represent the main themes of influential factors of customer satisfaction toward various star groups of hotels. Each factor's singular value reflects the variance extent the factor explains (Baker, 2005). For each factor in each of the star group of hotels, we conducted a *t* test to find the mean difference of the coordinates of customer reviews of chain or independent hotels on that factor, as also shown in Table 1.

**Factors Leading to Customer Dissatisfaction With Various Star-Level Groups of Hotels**

Similarly, we used the conceptual framework of Zhou et al.'s (2014) study, and according to the EFA results obtained from LSA, four main factors, including unfriendly staff/bad service, bad physical setting (including room, hotel, and food), bad location and environment, and bad value, were found for each star group of hotels. The influential factors that determined customer dissatisfaction from customer reviews for each star group of hotels are summarized in Table 2. The high-loading terms and mean difference for each factor are also shown in Table 2.

**Table 1**  
**Mean Difference of Positive Textual Review Relevance Between Independent and Chain Hotels**

Factors	Interpretations (Labels)	Singular Values	High-Loading Terms	Mean for Independent Hotels	Mean for Chain Hotels	Mean Difference and Significance
<i>Budget hotels</i>						
Factor 1	Good Value	3.145	Valu, valu_monei, includ, free, cheap, afford, pay, cost, rate, room_rate	0.0211	0.0188	0.0023***
Factor 2	Friendly Staff	2.980	Friendli_staff, friendli_help, front_desk, staff_help, desk_staff, staff_excel, polit, staff_good, ask_help, people	0.0067	0.0030	0.0033**
Factor 3	Convenient Location	2.869	conveni, conveni_locat, locat_conveni, downtown, citi, park, airport, river, place, mall	0.0069	0.0067	0.0002
Factor 4	Physical Setting	2.768	Bed_comfort, room_clean, comfort_room, comfort_hotel, spacious, room_spacious, pool_area, nice_bed, facil, good_bed	0.0086	0.0093	-0.0007
<i>Midlevel hotels</i>						
Factor 1	Friendly Staff	3.759	staff_nice, friendli_staff, nice_help, desk_staff, front_desk, staff_nice, help_friendli, help_staff, staff_great, staff_help	0.0043	0.0051	-0.0008
Factor 2	Physical Setting	3.082	comfort_bed, room_comfort, room_clean, nice_facil, clean_room, bathroom, breakfast_good, spaciou, nice_room, comfort_room	0.0116	0.0109	0.0007
Factor 3	Value	3.008	good_price, reason_price, afford, value, great_value, rate, booking_value, room_rate, reasonable, value_room	0.0043	0.0028	0.0015*
Factor 4	Location	2.900	Locate_great, haihwai, mall_highwai, easi_park, proxim, beach, walk_distanc, minute, proxim_distanc, garden	0.0035	0.0059	-0.0024***
<i>Luxury hotels</i>						
Factor 1	Convenient Location	2.569	Locat_good, easi_access, access, path_station, station, downtown, minut, street, locat_walk, shop	0.0006	0.0069	-0.0063**
Factor 2	Physical Setting	2.276	Comfort_room, facil, clean_room, size, spaciou, room_great, bed_comfort, bedroom, facil_great, facil_good	0.0128	0.0109	0.0018
Factor 3	Friendly Staff	2.247	Staff_wonder, frinedli_help, staff_friendli, staff_good, great_staff, front_desk, desk_clark, wonder-staff, excel_staff, iadi	0.0107	0.0138	-0.0031

\* $p < .1$ . \*\* $p < .05$ . \*\*\* $p < .01$ .

Table 2  
Mean Difference of Negative Textual Review Relevance Between Independent and Chain Hotels

Factors	Interpretations (Labels)	Singular Values	High-Loading Terms	Mean for Independent Hotels	Mean for Chain Hotels	Mean Difference and Significance
<i>Budget hotels</i>						
Factor 1	Location/ Environment	3.124	Smoke, noisi, smke_room, loud, street, sleep, room_smell, car, cigaret, smell_smoke	0.0233	0.0261	-0.0028***
Factor 2	Physical Setting	2.509	Wifi, poor_wifi, slow_wifi, connect, breakfast_area, poor_qualiti, toilet, outdat, mattress, room_cause	0.0070	0.0066	0.0004
Factor 3	Unfriendly Staff/ Bad Service	2.380	Service, custom, custom_service, front_desk, room_service, rude, request, mang, people, maid	0.0108	0.0124	-0.0016**
Factor 4	Value	2.316	Charg, price, extra, paid, card, deposit, issu, cash, reserv, rate	0.0086	0.0083	0.0003
<i>Midlevel hotels</i>						
Factor 1	Physical Setting	3.162	Uncomfort, facil, tv, pillow, wifi, broken, light, lobbi, bed_ uncomfort, updat	0.0197	0.0198	-0.0001
Factor 2	Location/ Environment	2.623	Window, construct, street, area, freewai, pool_close, loud, nois, overnight, highwai	0.0019	0.0023	-0.0004***
Factor 3	Value	2.500	Bit_expens, expens, offer, park_fee, bed_deal, cheaper, rate, charg, over_price, monel	0.0054	0.0055	-0.0001
Factor 4	Unfriendly Staff/ Bad Service	2.321	Staff, restaurant_staff, busi, peopl, slow_service, bother, housekeep, attend, wait_hour, exteren_slow	0.0073	0.0056	0.0017*
<i>Luxury hotels</i>						
Factor 1	Value	2.240	Expens, expens_park, park_expense, resort_fee, pai, cheaper, addit_pai, monel, servic_charg, addit_expens_charg, overpri	0.0117	0.0111	0.0008
Factor 2	Unfriendly Staff/ Bad Service	2.225	Front_desk, room_service, servic, staff_front_desk, waiter, rude, custom_service, check_clerk, complain, front_desk, staff_rude	0.0109	0.0073	0.0036**
Factor 3	Location/ Environment	2.207	Pool_close, noise, indoor_noisi, neighbor_noisi, night_anno, construct_nearby, entranc_hard, vehicle_access, hotel_hard_ get, traffic	0.0138	0.0104	0.0034**
Factor 4	Physical Setting	2.093	Elev_slow, lobbi, loung, room_bed, gym, hallwai, damag, stair, kitchen, remodel	0.0126	0.0127	-0.0001

\*p < .1. \*\*p < .05. \*\*\*p < .01.

## DISCUSSION

### **The Relevance of Product and Service Attributes: Chain Hotels Versus Independent Hotels**

Our results rejected Null Hypothesis 1a and Hypothesis 1b. According to Table 1 and Table 2, the relevance of product and service attributes is different for chain hotels versus independent hotels. Significant differences appear between chain hotels and independent hotels for 5 out of 11 positive and 6 out of 12 negative factors.

The different relevance of online customer textual reviews to certain attributes of products and services between chain and independent hotels may be caused by customers' familiarity with the independent and chain hotels. Less familiarity makes customer preexpectations vary, which stimulates extreme emotions and perceptions about the perceived quality, and this results in eWOM through online textual reviews (Torres & Kline, 2013). In addition, customers posting online textual reviews aim to provide helpful information to future customers (Salehan & Kim, 2016). Customers are motivated to describe the core attributes of products and services of independent/chain hotels in online textual reviews in more detail to help future customers make purchase decisions. This can be explained by differences in customers' familiarity and expectations between independent and chain hotels and differences in the perceived standard, implementation of operations management, and operating efficiency between independent and chain hotels (Botti et al., 2009).

### **The Relevance of Product and Service Attributes: Each Star-Level of Hotel**

Our results rejected Null Hypothesis 2a. According to Table 1, the relevance of positive online customer textual reviews to certain attributes of products and services between chain and independent hotels is different among different star-level groups. For positive reviews of budget hotels, relevance is different for the attributes of value and friendly staff. For the value attribute, a possible reason for this finding is that the price variation of independent hotels is higher than that of chain hotels (O'Neill & Carlbäck, 2011), which stimulates customers to evaluate value in more detail in textual reviews. For the staff attribute, a possible reason for the finding is that many economy hotels are family owned (Kang, Chiang, Huangthanapan, & Downing, 2015). As family members, the staff is more motivated to show a positive attitude to customers and provide satisfactory service. For midlevel hotels, relevance is different for the attributes of value and location. Relevance of the location attribute is different between chain and independent hotels for both midlevel and luxury hotels. Convenient locations within walking distance to attractions or that have easy access to transportation benefit customers' travel experiences and thus prompt customers' detailed descriptions in textual reviews. It is also interesting to note that the value factor is not found



by LSA in luxury hotels, which shows that luxury hotel customers do not mention good value in detail. Luxury hotels provide premium products and services and target business travelers and leisure travelers with high incomes, and therefore have the lowest ratio of functionality to price (Heo & Hyun, 2015).

Our results failed to reject Null Hypothesis 2b. Hypothesis 2b focused on negative reviews for the different star levels of hotels. From Table 2, we could see there are four negative attributes found in customer reviews. When viewing Table 2 vertically, we could see that among these four negative attributes, for the two attributes physical settings and value, there is no statistical difference between the relevance of negative online customer textual reviews commenting on these two attributes between chain and independent hotels among economy, midlevel, and luxury hotels. For the other two attributes, unfriendly staff/bad service and location/environment, we found that although there is a statistical difference in the relevance of negative online customer textual reviews commenting on these two attributes between chain and independent hotels, those differences are consistent among different star levels of hotel. In other words, for all the economy, midlevel, and luxury hotels, customers have different comments on the attributes of unfriendly staff/bad service and location/environment between chain and independent hotels in each star-level of hotels. This is because these two factors are intangible. Compared with using pictures to present physical settings and using price to present value, intangible attributes are much harder to show on hotel booking websites. In addition, the standards of intangible attributes have higher variation compared with tangible attributes, and the perceived quality of intangible attributes is harder to measure (Ren et al., 2016). These all cause the relevance of negative online customer textual reviews to intangible attributes between chain and independent hotels to differ.

### **The Relevance of Product and Service Attributes to Customer Satisfaction Versus Dissatisfaction**

Our results rejected Null Hypothesis 3. According to Table 1 and Table 2, the relevance of positive and negative customer online textual reviews to some attributes of products and services between chain and independent hotels is dissymmetric. In other words, high praise for an attribute does not necessarily reduce complaints about it. Although the significance of relevance of textual reviews to positive reviews is different among the value, location, and staff attributes, the significance of relevance of textual reviews to negative reviews is different between the staff and location attributes between chain and independent hotels.

This showed the coexistence of customer satisfaction and dissatisfaction (Chen et al., 2014). Customers can be satisfied with certain aspects of one attribute of products and services and may be dissatisfied with other aspects of this attribute (Zhou et al., 2014). The asymmetric relevance relationship exists more for intangible attributes such as staff and location, which supports the existing

theory of service quality dual-dimensional structure separating tangible and intangible attributes (Berezina et al., 2016).

## IMPLICATIONS

### Theoretical Implications

This study had significant theoretical implications and contributions. First, the findings of our study supported prospect theory (Kahneman & Tversky, 1979), which differentiates the roles of positive and negative attributes on customer perception. The findings of our study extended the prospect theory by examining the role of business type (chain/independent hotels, hotels with different star levels) on customer satisfaction and dissatisfaction. This showed the impact of different operating strategies, pricing, organizational structures, and target markets of different types of hotels on customer expectation, familiarity, satisfaction, and dissatisfaction (Choi & Mattila, 2004; Tam, 2008). The findings of this study also supported utility theory, which indicates customers' perceived utility is decided by the perceived quality of attributes of hotel products and services and the room rate offered by various star levels of hotels.

Second, the three-dimensional comparisons in this study enriched attribute theories and models (Mittal et al., 1998) by comparing customers' perceived quality of attributes of products offered by chain/independent hotels and hotels with different star levels and their influence on customer satisfaction and dissatisfaction. This study showed customers often evaluate their hotel-stay experience at the attributes level instead of the products and services level. This study contributed to attribute theories and models by extending the influential factors of perceived attributes to business types.

Third, this study provided an approach to examining customer perception through the writing style of online reviews. We examined online review structure, namely the relevance of reviews on specific attributes. Higher relevance indicated more detailed and targeted discussion of the attributes in the reviews, which reflects the key drivers of customer perception. This study provided a technical approach using LSA and statistical tests to examine human natural language and the essentially influential attributes of customer perception.

### Managerial Implications

The business value of online customer textual reviews is reflected in two aspects: generating eWOM to influence future customer purchase decisions and helping businesses understand customers better (Cantallops & Salvi, 2014). The open structure of textual reviews (comments) reflects the customer consumption experience and customers' perceptions in greater detail and accuracy compared with customer ratings (Berezina et al., 2016; Xu & Li, 2016). Unfortunately, due to their open structure and long length, textual reviews have a complex structure, and customers may not spend the time to read reviews carefully from the very

beginning to the end. Therefore, the main body of the textual reviews, as shown by the detailed description and discussion of one or more attributes in the textual reviews, is important to influence future customers.

In this study, we used online customer reviews to examine the relevance of core attributes to hotel customer satisfaction and dissatisfaction through LSA and statistical tests. Different types of hotels can use online customer reviews as a way to improve their performance and use dissatisfied customer reviews as a source for innovative service ideas (Duverger, 2012).

In detail, according to the attributes identified from customer reviews, economy chain hotels should enhance the value, location and environment, and staff attitude and services. Economy independent hotels should enhance the physical settings. Midlevel chain hotels should improve the location and environment. Midlevel independent hotels should supplement and reinforce the staff attitude and services. Luxury chain hotels should enhance physical settings. Luxury independent hotels should improve their location, value, and staff attitude and services. Given limited resources, hotels should set priorities to improve the above attributes depending on their types.

We found the role that chain/independent hotels and hotels with different star levels play in influencing customer-perceived positive and negative attributes. This provided a guideline for hotels of certain types to understand market segmentation and the corresponding customers' expectations, needs, and perceptions of the perceived quality of various attributes of products and services. Hotels should use customer reviews as a roadmap to implement different targeted operating strategies and obtain certain certifications to meet customer expectations and needs based on market segmentation and targeted customers (Schuckert et al., 2015) to satisfy and even delight them.

Hotels with different star levels charge different prices and offer different levels of quality of attributes of products and services to customers. Although hotels with higher star levels usually offer a higher quality of core attributes and more varied auxiliary attributes of products and services, hoteliers should know this will not necessarily lead to customer satisfaction. According to utility theory (Lancaster, 1971), customers often rank the alternatives depending on their order of preference, and often compare the paid price and the received products and services attributes. Customers will only spend money on an additional unit of product/service attribute when its marginal utility is at least equal to or greater than that of a unit of another product/service attribute (Lancaster, 1971). Lower price and higher quality of attributes generate higher perceived utility. The higher price raises customer expectations; thus, when the perceived attributes do not meet their expectations, customers are dissatisfied. This explains the reasons customers frequently mentioned "low value" in the cons of the hotels. Hotels should keep raising the positive gap between the offered attributes of products/services and charged price instead of the absolute value of attributes of products/services to enhance customers' perceived utility and value and raise their satisfaction.

Our study also provided a reference for hotels' franchising decisions. Customers' different perceptions of franchised chain hotels and independent hotels may be caused by the different productivity of franchised chain hotels and independent hotels (Botti et al., 2009). Online customer reviews provide an opportunity for each type of hotel to use benchmarking techniques referring to customers' positive and negative evaluations of each attribute.

## **EXTENSIONS AND CONCLUSIONS**

### **Future Extensions**

Future studies can extend our research in the following directions. First, our methodology can be applied and extended to explore online customer textual reviews in broader fields such as other types of hospitality businesses or other industries. The comparison can also be extended to various time ranges to show the relevance change of customer perceptions and perceived quality of the business over time. Second, online management such as managers' responses to online customer reviews and commitment to change and compensation of service failure influence future online customer reviews (B. Gu & Ye, 2014). Our methodology can also be applied to explore the online textual responses from hotel managers to text-mine hoteliers' responses and customers' perceptions. Third, the different influences of various attributes and the corresponding relevance of textual reviews to customer overall satisfaction ratings can be explored.

In addition, the current research can be improved on in the following ways. With regard to methodology, future research might explore using other text-mining methods, such as probabilistic latent semantic analysis (PLSA). PLSA is widely used in information retrieval and filtering, human natural language processing, machine learning from text, and related fields (Hofmann, 2001). PLSA is particularly well-suited to using multinomial word distributions to assign high probabilities to words mentioned more frequently in the text of online reviews, and thus can identify relevant topics and attributes in such reviews (Lu, Zhai, & Sundaresan, 2009). PLSA can efficiently identify and infer multiple topics from online reviews by maximizing the likelihood of appearance of key phrases in the text data (Lu et al., 2009). In addition, future research might examine additional factors that may influence customers' perceptions of hotels and their online review behaviors. Trust can be one of these factors. Chain and independent hotels' different reputations, levels of service expertise, product and service performances, and operations can influence customers' cognitive trust as well as their affective trust (Johnson & Grayson, 2005). Thus, future studies can discuss the role of customers' varying trust of chain and independent hotels in influencing their satisfaction or dissatisfaction with the hotels and their subsequent online review behavior.

### **Conclusions**

Through LSA and statistical tests, our study examined and compared the relevance of core attributes of hotel products and services with customer satisfaction

and dissatisfaction. We found these attributes, including staff, physical setting, value, and location, had different effects on customer satisfaction and dissatisfaction with chain and independent hotels and hotels with different star levels. This revealed the role of hotel types in influencing customers' perceived attributes. Furthermore, we found the factors leading to customer satisfaction and dissatisfaction are asymmetric for certain attributes.

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**Xun Xu**, PhD (e-mail: [xxu@csustan.edu](mailto:xxu@csustan.edu)), is an assistant professor in the Department of Management, Operations, and Marketing in College of Business Administration at California State University, Stanislaus, CA.