



## Predicting overall customer satisfaction: Big data evidence from hotel online textual reviews



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### ABSTRACT

Customer online reviews of hotels have significant business value in the e-commerce and big data era. Online textual reviews have an open-structured form, and the technical side, namely the linguistic attributes of online textual reviews, is still largely under-explored. Using a sample of 127,629 reviews from tripadvisor.com, this study predicts overall customer satisfaction using the technical attributes of online textual reviews and customers' involvement in the review community. We find that a higher level of subjectivity and readability and a longer length of textual review lead to lower overall customer satisfaction, and a higher level of diversity and sentiment polarity of textual review leads to higher overall customer satisfaction. We also find that customers' review involvement positively influences their overall satisfaction. We provide implications for hoteliers to better understand customer online review behavior and implement efficient online review management actions to use electronic word of mouth and enhance hotels' performance.

### 1. Introduction

In the e-tourism era, many customers book hotels online and post reviews after their stay. These online reviews, in the format of both textual reviews (comments) and ratings, generate an electronic-word-of-mouth (eWOM) effect, which influences future customer demand and hotels' financial performance and thus have significant business value (Xie et al., 2014).

Customers' ratings indicate their satisfaction, whose antecedents and influence have been extensively studied in the literature (e.g., Banerjee and Chua, 2016; Schuckert et al., 2015). One of the biggest strengths of researching customer ratings is that ratings can show overall customer satisfaction in a direct way. Recently, many studies have focused on textual reviews (Xiang et al., 2015; Berezina et al., 2016). The strengths of researching customer textual reviews are that they can show customer consumption experiences, highlight the product and service attributes customers care about, and provide customers' perceptions in a detailed way through the open-structure form. Researchers and hoteliers want to know both (a) the details about hotel guests' experiences to improve the corresponding product and service attributes and (b) customers' overall evaluation of the hotel stay experience to obtain a snapshot of the hotel's operational performance

and overall customer satisfaction or to develop marketing strategies to better promote the hotel (Cantalalpo and Salvi, 2014).

However, two challenges exist when hoteliers try to understand both sides of the coin. The first challenge is the information overload of individual-level reviews or comments. Numerous comments in the open structure of online textual reviews or face-to-face conversations as feedback from hotel guests are available online and offline. The written comments often contain a substantial number of words and are time consuming to read one by one in detail. The second challenge is the lack of availability of a holistic satisfaction measure. In the face-to-face conversation environment, it is often hard to capture customers' overall evaluation of their hotel experience directly. Customers may not reveal their true evaluation, especially when they have a negative perception, because of worries about breaking the customer–seller relationship or concerns about the hotel “losing face” (Au et al., 2010). In some cases, it may be infeasible to develop a specific scale by which customers can give a single rating to evaluate the whole product or service. In the comment card and online review environment, customer comments as verbal protocols in terms of customers' online textual reviews, as opposed to direct measures, can avoid eliciting customers' perceptions (Smith and Bolton, 2002). The direct measurement of customer ratings in terms of closed-ended survey questions can confound the data of

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customers' true evaluation because of variations in survey design from different review platforms (Weber, 1985; Xiang et al., 2017).

A technical approach to link the relationship between customers' overall satisfaction and their textual comments is needed to address these major challenges. Technical attributes of textual reviews can explain significant variations in customer ratings, and technical attributes of online textual reviews can have a significant effect on customer ratings (Geetha et al., 2017). To link the two sides of the coin, this study uses customers' online review behavior to predict their overall satisfaction with hotels. Many previous studies focus on the indications and contents of customer online reviews (e.g., Xiang et al., 2015; Xu and Li, 2016), but few studies discuss the linguistic style, namely the technical attributes of the online reviews themselves (e.g., Geetha et al., 2017). The main reasons lie in the fact that examining technical attributes of online textual reviews is an extremely costly task with unstable and difficult-to-interpret measurements (Chevalier and Mayzlin, 2006; Godes and Mayzlin, 2004).

Previous studies have found inconsistency in customers' opinions mined from their textual reviews and their ratings, and the sentimental interplay between customer textual reviews and customer ratings can be influenced by their satisfaction level (Zhang et al., 2016b). Previous studies have found that the sentiments of online textual reviews and customer ratings are highly correlated (e.g., Geetha et al., 2017; He et al., 2017); however, the relationship among other technical attributes of online textual reviews, such as subjectivity, diversity, readability, length, and customer ratings is still largely under-explored (Geetha et al., 2017). To fill this research gap, this study aims to provide a full picture of the role of technical attributes of online textual reviews and bridge the technical aspects of customer reviews with their indications of overall satisfaction with hotels. We aim to understand how customers behave in writing online reviews in terms of what types of words they use and how long they write to reflect their overall evaluation of their hotel stay experience. This leads to the first question of this study: What is the effect of the linguistic attributes of online textual reviews, including subjectivity, diversity, readability, polarity, and length of individual review, on overall customer satisfaction? Subsequently, the second research question is as follows: Given those technical attributes of textual reviews, what are the most important technical attributes showing customer opinions about hotels, as measured by the highest influential level on customers' overall satisfaction?

In addition, different customers can exhibit different online review behaviors and perceptions of hotels depending on their demographic background, such as language group (Schuckert et al., 2015), and trip information, such as travel purpose (Xu et al., 2017). Different levels of review involvement and engagement in the online community (i.e., active or non-active) reveal customers' personalities and aspects of their hotel stay and review experience, which influence their perception of hotels (Zhang et al., 2010). However, the role of the reviewer's involvement in the online review community in influencing overall customer satisfaction is still unknown. To fill this research gap, we pose our third research question: What is the effect of review involvement on customers' overall satisfaction?

The main contribution of this study is that it bridges the technical side, namely the linguistic style of online reviews, with overall customer satisfaction. This is one of the first studies to investigate the role of technical variables of online customer reviews, including subjectivity, diversity, readability, sentiment polarity, and length of review, in predicting customers' overall satisfaction along with the role of customers' review involvement in influencing their overall satisfaction. In addition, the importance of the role of these technical variables of online customer reviews in influencing customers' overall satisfaction is examined.

Examining the relationship between the technical attributes of online textual reviews and customers' overall satisfaction can help hotels and online hotel booking agents to obtain richly structured descriptions of customers' sentiments and other technical information from the

unstructured online textual reviews. It can also help them better design feedback systems to raise the quality of information received and thus to enhance their products and services based on customers' online textual reviews and ratings (Zhang et al., 2016b). The relationship between the technical attributes of online textual reviews and customers' ratings also influences future customers' demands because customers tend to read both textual reviews and ratings to justify their consistency (Chevalier and Mayzlin, 2006; Ludwig et al., 2013). Customer ratings supported by lengthy textual reviews containing rich information are favored by customers, and thus hotels should identify and promote the most influential reviews and provide instructions to motivate customers to write powerful reviews (Ludwig et al., 2013).

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 proposes the hypotheses. Section 4 introduces the methodology. Section 5 presents the results. Section 6 discusses the results. Section 7 provides theoretical and managerial implications, and Section 8 concludes the study.

## 2. Literature review

### 2.1. Motivation and impact of hotel online reviews

Customers are generally motivated by four incentives to write online reviews. The first is altruism and reciprocity. Customers posting online reviews based on this motive seek to help future hotel guests make better decisions about hotel stay choices and help hotels improve their service operations (Yoo and Gretzel, 2011). The second is fulfilling customers' psychosocial needs. Customers posting online reviews for this reason can show their satisfaction and admiration or their dissatisfaction and complaints toward a hotel (Cantalalops and Salvi, 2014). The third is customers' social needs. They want to obtain a positive reputation in an online community such as by being voted "helpful" (Kwok and Xie, 2016), gain social identification in the travel community (Cheung and Thadani, 2012), or anticipate hotel managers' online responses (Gu and Ye, 2014). The fourth incentive is economic by which they earn rewards from an online review platform when they post reviews (Hennig-Thurau et al., 2004). Customers' linguistic style is influenced by their motivation for writing online reviews (Ludwig et al., 2013).

The impacts of online reviews are mainly disseminated through the generated eWOM and include influencing future customers' purchase intentions, trust, customer demand, and hotels' financial performance (Sparks and Browning, 2011; Vermeulen and Seegers, 2009). Hotels use online customer reviews to understand customers' expectations and needs and improve the corresponding products and services (Gu and Ye, 2014).

### 2.2. Examining hotel online textual reviews

Compared with ratings, which are structured, online textual reviews are unstructured user-generated contents (Zhang et al., 2016b). Thus, online textual reviews can reflect customers' consumption experience and perceptions in more detail compared with customer ratings (Xu and Li, 2016). Previous studies focusing on hotel online reviews can be categorized into two types. The first category focuses on the contents of textual reviews to find the attributes mentioned by hotel guests and their perceptions of their hotel stay experiences. These attributes include room quality, staff attitude and behavior, location, access, value, food, and so on (Xu and Li, 2016). The perceptions include customer satisfaction and dissatisfaction (Berezina et al., 2016) based on the assumptions that positive reviews indicate satisfaction and negative reviews indicate dissatisfaction. Many studies use text mining techniques including content analysis (Li et al., 2013), frequency analysis (Xiang et al., 2015), text-link analysis (Berezina et al., 2016), and latent semantic analysis (Xu and Li, 2016) to examine attributes of the hotel products and services that customers care about. Zhang and Mao (2012)

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