

# Understanding the Impact of Online Reviews on Hotel Performance: An Empirical Analysis

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## Abstract

Understanding consumers' needs and wants has been a major source of success for hotel organizations. Notwithstanding, investigating the valence of online reviews and modeling hotel attributes and performance is still a rather novel approach. Using partial least squares path modeling, Swiss country-level data for online reviews from 68 online platforms, together with data from 442 hotels, we test 11 hypotheses. Our research model includes three distinctive areas of the hotel: physical aspects, quality of food and drink, and human aspects of service provision. RevPAR and occupancy are employed as performance metrics. We also test for mediation effects. Results indicate that hotel attributes, including the quality of rooms, Internet provision and building show the highest impact on hotel performance, and that positive comments have the highest impact on customer demand. This study contributes to theories of valence on hotel performance and presents salient implications for practitioners to enhance performance.

## Keywords

hotel attributes, hotel performance, online reviews, UGC, valence, partial least squares path modeling

## Introduction

During the first decade of the 21st century, tourism infrastructure has become more digital, with increased interconnections between suppliers, firms, and customers. Within these challenging competitive environments, tourism organizations need to identify real sources of business value creation. Several authors advocate that tourism organizations need to be continually fine-tuning their products and services based on information received from customers (Levy, Duan, and Boo 2013; Zeng and Gerritsen 2014).

With the increasing popularity of the Internet, electronic word of mouth (eWOM) on social media has become an important tool for customers seeking and sharing information on products and services (Filieri and McLeay 2013; Podnar and Javernik 2012; Zhou et al. 2014). Online customer reviews as a particular form of eWOM have become the most important information source in customers' decision making (Ye et al. 2011) and are deemed more successful in influencing consumer behavior than traditional marketing, information provided by product providers, or promotion messages of third-party websites (Gretzel and Yoo 2008; Yang and Mai 2010; Zhang et al. 2010). Consequently, social media marketing has emerged as a dynamic and challenging field in a marketing manager's toolkit (Dev, Buschman, and Bowen 2010). Furthermore, tourism organizations can no longer ignore the information exchange that is happening among their consumers (Riegner 2007).

Because of the growing importance of online reviews for companies, empirical research has heavily focused on their impact on consumer perceptions and decision-making processes (Liu and Park 2015; Pantelidis 2010; Park and Nicolau 2015; Ryu and Han 2010; Zhang et al. 2010), but less has investigated the impact of consumer reviews on business performance (Duverger 2013; Ye et al. 2011). For analytical purposes, online reviews are often decomposed into valence, variance, and volume of reviews, with valence being of particular importance for business performance (Chevalier and Mayzlin 2006; Chintagunta, Gopinath, and Venkataraman 2010; Dellarocas, Zhang, and Awad 2007). Hence, this study focuses its investigations onto the valence of online reviews. More specifically, we aim to analyze in greater detail the antecedent effects of hotel attributes on hotel business performance considering customers' voice as expressed through the valence of reviews. Within the hotel industry, there is limited evidence of research into the impact of customers'

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voice via characteristics such as physical hotel attributes, service, and hotel location on business performance. We propose a model that helps to explain which aspects of visitor experience, as voiced through social media, have the greatest impact on hotel Demand (Room Occupancy) and subsequently Revenue (RevPAR). We further advance existing research (which used a sample of a single market; see e.g., Blal and Sturman 2014) by expanding the geographical location to country level and by using a “soft modeling” (partial least squares) approach rather than “hard modeling” (via covariance methods such as LISREL) to validate antecedents of hotel performance as encouraged by Xie, Zhang, and Zhang (2014), Anderson (2012), and Phillips et al. (2015). In addition, instead of using only one source of online reviews (e.g., Xie, Zhang, and Zhang 2014; Blal and Sturman 2014) we use an aggregated score of 68 review platforms to analyze 22 hotel attributes. By using actual RevPAR and occupancy performance data matched to the online reviews, we further contribute to the tourism literature as we advance previous studies that used proxies such as hotel room sales or booking data (Chevalier and Mayzlin 2006; Ghose and Ipeiroitis 2011; Ye, Law, and Gu 2009; Ye et al. 2011).

The remainder of the paper is organized as follows. In the next section, we consider the emergence of online reviews, valence, and its relationship with business performance. The Swiss hotel industry is then briefly described to provide some context, before we explain our proposed model, variables, and hypotheses development. Subsequently, the research methodology is outlined. Finally, we present the results of our empirical analysis and round off with a discussion, conclusions, recommendations for researchers and practitioners, and limitations of the study.

## Online Reviews

Because of the emergence of Web 2.0 and the increasing number of online platforms, consumers frequently communicate and interact online with other web users to share their experiences about products and services (Buhalis and Law 2008; Dellarcas, Zhang, and Awad 2007; Filieri 2015; Leung et al. 2013). The information exchanged online is termed user-generated content (UGC) or eWOM, which refers to “any positive or negative statement made by potential, actual or former consumers about a product or company, which is made available to a multitude of people and institutions via the Internet” (Hennig-Thurau et al. 2004, 39). UGC not only captures online reviews, recommendations, and opinions exchanged by consumers (Serra Cantallops and Salvi 2014) but also forms the bases on which consumers revise their purchase decisions and ultimately change their buying behavior (Serra Cantallops and Salvi 2014; Sparks and Browning 2011).

As a result, existing research has predominantly adopted a marketing perspective and extensively analyzed the impact of online reviews on consumer behavior and decisions (see,

e.g., Chen and Huang 2013; Purnawirawan, Pelsmacker, and Dens 2012; Sparks and Browning 2011). Consumers pay close attention to various dimensions when reviewing other consumers’ comments (Jang, Prasad, and Ratchford 2012; Liu 2006; Ögüt and Taş 2012). Previous research has further decomposed online reviews into valence and volume, for example, and analyzed the relevance of these elements for consumer decision making and business performance (for a comprehensive review, see Floyd et al. 2014 and Kostyra et al. 2015). While the volume of online reviews has been extensively researched, Floh, Koller, and Zauner (2013) argue that the valence (sometimes referred to as quality) of online reviews has received less attention.

The *valence of online reviews* refers to the average numerical rating, that is, positive, negative, or neutral reviews, or the absence or presence of those on websites (Chevalier and Mayzlin 2006; Duan, Gu, and Whinston 2008; Liu 2006; Tang, Fang, and Wang 2014; Ye et al. 2011). While it has been found that positive opinions may enhance customers’ attitude and choice probability for a product, negative reviews have been found to discourage potential customers from purchasing (Dellarocas, Zhang, and Awad 2007; Floyd et al. 2014). By examining valence intensity, a considerable amount of research within the field of marketing suggests that because of the negativity effect (Tsang and Prendergast 2009), negative reviews are stronger, more influential, and difficult to resist than positive reviews (Baumeister et al. 2001; Casalo et al. 2015; Chevalier and Mayzlin 2006; Cui, Lui, and Guo 2012; Maheswaran and Meyers-Levy 1990; Papathanassis and Knolle 2011) and hence influence consumers’ decision making more than positive reviews (Xie, Zhang, and Zhang 2014). Some researchers found positive reviews to have minimum or no effect (e.g., Duan, Gu, and Whinston 2008).

Upon investigating the impact of valence on business performance, previous research has identified different effects of positive, negative, and neutral reviews (see, e.g., Chevalier and Mayzlin 2006; Duan, Gu, and Whinston 2008; Godes and Mayzlin 2004; Sun 2012; Tang, Fang, and Wang 2014). Overall, the majority of previous studies have found a positive relationship (mainly in movie and e-book industries) (Chevalier and Mayzlin 2006; Chintagunta, Gopinath, and Venkataraman 2010; Clemons, Gao, and Hitt 2006; Dellarcas, Zhang, and Awad 2007; Dhar and Chang 2009; Sun 2012; Ye et al. 2011) and some nonsignificant relationships (Amblee and Bui 2011; Duan, Gu, and Whinston 2008; Liu 2006). Neutral reviews have been found to have a positive effect on sales (Sonnier, McAlister, and Rutz 2011), or a mixed effect as shown by Tang, Fang, and Wang (2014), who found that mixed-neutral reviews had a positive impact on business performance, while indifferent-neutral online reviews negatively affected it. Examining effects within the hotel industry, Ye, Law, and Gu (2009) found a significantly positive relationship between online consumer ratings and the number of hotel bookings, which they used as proxies for

hotel performance. In a follow-up study, Ye et al. (2011) showed that the valence of traveler reviews had a significant impact on the online sales of hotel rooms.

In order to explain the contradictory findings across different industries, some researchers explored contextual variables such as market (Chintagunta, Gopinath, and Venkataraman 2010), product type in terms of degree of involvement (Mudambi and Schuff 2010), and whether it is a search or experience good (Gu, Park, and Konana 2012). With regards to the hotel industry, it has been shown that the type of hotel influences the effect of online reviews on business performance (Blal and Sturman 2014). Focusing upon the effect of online reviews for certain hotel attributes (i.e., services, location, price, room, and cleanliness), Xie, Zhang, and Zhang (2014) showed significant associations with hotel performance. More specifically, they found that ratings of location and cleanliness positively influence hotel performance, while ratings for purchase value are negatively associated with performance.

Overall, the majority of studies has investigated online reviews from a marketing perspective and explores their impact on customer behavior and decision-making (see, e.g., Serra Cantallops and Salvi 2014; Sparks and Browning 2011). The importance of analyzing the components of online reviews in more depth has proven useful as differences were found in relation to volume, variance and valence. A more in-depth analysis of valence has revealed different effects of positive, negative, and neutral comments. Yet, investigating the impact of valence on business performance, and hence adopting a strategic management perspective, has received less attention, probably because of the difficulty of matching online reviews to actual performance data. The results of the few studies that have been conducted in this area revealed mixed results and, thus, some researchers followed the call for research into the impact of contextual factors (e.g., Kim, Lim, and Brymer 2015; Xie, Zhang, and Zhang 2014). Similarly, we argue that a more differentiated view into customers' preferences as shown in the valence of online reviews can provide more detailed insights into the relationship between online reviews and business performance. The vast majority of present research has largely neglected the potential interaction effects among hotel attributes and their impact on business performance (see, e.g., Xie, Zhang, and Zhang 2014) and considering customers' voice would clearly provide meaningful insights needed for the strategic management of online reviews. Table 1 summarizes existing research into the impact of valence on business performance for the hotel industry.

## Swiss Hotel Industry Characteristics

With its small size, safety, and clean air, Switzerland was among the first tourism markets to expand rapidly, and in the 1950s, Switzerland was among the top five destinations worldwide by volume (Horwath 2013). However, the Swiss

tourism industry has been stagnating for the past four decades (Sund 2006) and felt the pain of the recession between 1992 and 1996 (OECD 2000). The advance of globalization continues to lessen the appeal of the traditional alpine leisure resort and the Swiss tourism industry continues to be challenged, with small firms scattered across the country, small marketing budgets, and rather tired property stock.

Switzerland is divided into 26 cantons: German-speaking and French-speaking cantons, one Italian-speaking canton, and some dual-speaking cantons where both German and French are spoken. Domestic and international tourism still remain integral to the Swiss economy. The hotel and restaurant industry is the sixth biggest employer and involves 234,000 employees (Swiss Tourism Federation 2010). The Swiss franc is particularly strong compared to other currencies, which together with the relatively high cost of living makes it imperative for the sector to demonstrate quality. At the time of this study, this observation is rather pertinent as the worldwide international tourism market was rebounding after the 2008 financial crisis. The accommodation sector accounts for more than 25% of the tourism value-added (Swiss Tourism Federation 2010). Nevertheless, the Swiss hotel supply consists of approximately 10% of branded hotels, which is one of the lowest in Europe (Schofield and Partners 2013).

In 2010 the Swiss hotel industry recorded a total of 36.2 million overnight stays, which was an increase of 1.7% from the previous year. Indigenous demand amounted to 15.8 million overnight stays and foreign demand generated 20.4 million overnight stays, amounted to annual increases of 2.2% and 1.4% respectively. Germans accounted for the strongest demand with 5.8 million overnight stays (a fall of 3.6% compared with 2009), followed by visitors from the United Kingdom at 1.9 million (−0.1%) and the United States 1.5 million (8.9%). In 2010, visitors stayed an average of 2.2 nights in hotels in Switzerland: foreign visitors stayed an average of 2.4 nights, while Swiss visitors stayed 2.1 nights. The Swiss hotel industry needs to remain attractive to its salient international markets, and at the same time should develop strategies to reposition itself in terms of regional and national markets.

## Proposed Model, Variables, and Hypotheses Development

### *Hotel Attributes and Online Reviews*

Consumers' preferences can be dynamic and expensive to monitor, but advances in technology have reduced the cost of collecting and mining data in an efficient and nonintrusive manner (Li et al. 2015). Previous studies have identified hotel characteristics associated with online customer satisfaction (e.g., Radojevic, Stanistic, and Stanic 2015).

Consumers are influenced by customer ratings of hotel attributes, which affect bookings and ultimately performance.

**Table 1.** Previous Research on the Impact of the Valence of Online Reviews on Business Performance in the Hotel Industry.

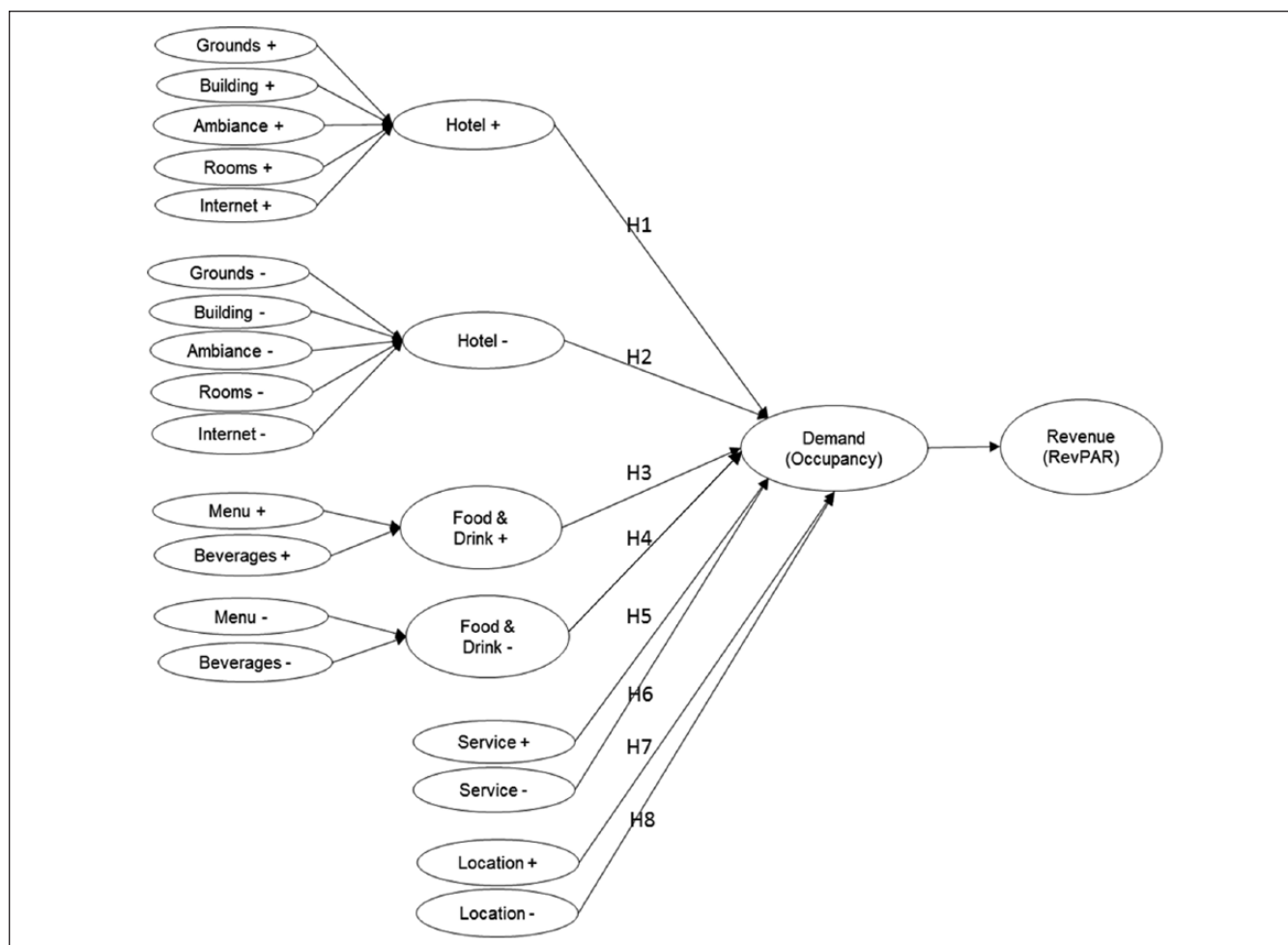
Author(s) (Year)	Purpose of Research	Data Analysis Technique	Findings	Sector	Data Source of Online Reviews
Ye, Law, and Gu (2009)	Impact of online consumer-generated reviews on hotel room sales	Log-linear regression model	Positive online reviews significantly increased the number of hotel bookings	Hotels	Ctrip.com (Chinese travel website)
Ye et al. (2011)	Impact of online user-generated reviews on hotel room sales	Log-linear regression model using number of reviews as a proxy for hotel room sales	Positive impact of review valence on online room sales	Hotels	Ctrip.com (Chinese travel website)
Anderson (2012)	Impact of user reviews on hotel pricing power, consumer demand, and revenue performance	Logistic regression	Positive relationship confirmed	Hotels	comScore and TripAdvisor
Öğüt and Taş (2012)	Impact of star rating and customer rating on hotel room sales and prices	Regression analysis using ordinary least squares	Improvement in customer ratings result in higher sales and higher pricing of hotel rooms	Hotels	Booking.com (hotel booking website)
Blal and Sturman (2014)	Impact of contextual factors such as product type on relationship between eWOM and sales performance	Hierarchical linear modeling	Valence has a greater effect on luxury hotels' RevPAR while the volume of reviews has a greater effect on lower-tier hotels	Hotels	Tripadvisor.com
Nieto et al. (2014)	Explore effects of eWOM on business performance	Regression analysis	More positive valence reviews positively affect performance; more negative valence reviews negatively affect performance	Rural lodging establishments	Toprural.com
Xie, Zhang, and Zhang (2014)	Impact of consumer reviews and management responses on performance	Linear regression modeling	Overall ratings influence hotel performance the most, followed by review variation and the amount of reviews posted	Hotels	Tripadvisor.com
This study	Impact of online customer reviews related to 22 hotel attributes on business performance	Partial least squares path modeling	Positive comments about hotel most important, driven by the sub-attributes of rooms, Internet, and building	Hotels	TrustYou Score (aggregated data from 68 online platforms)

Echoing these statements, the influential nature of online customer reviews is considered as one of the most crucial topics for understanding firm performance in hospitality and tourism (Filiari 2015; Mauri and Minazzi 2013; Serra Cantallops and Salvi 2014). However, efforts to address such issues have been limited (Li et al. 2015). Moreover, despite some theoretical advances, one question that previous research leaves open is what antecedent factors influence both hotel occupancy and hotel RevPAR. More specifically, this study adopts a strategic perspective to investigate the impact of the valence of reviews for hotel attributes on business performance. Xiang et al.

(2015) assert that it is important to understand the antecedents of hotel guest satisfaction. Such antecedents will include the core hotel product together with an array of facilities supporting and augmenting the guest experience.

Predefined hotel attributes used in prior studies have been summarized by Li et al. (2015). As the increasing interaction among consumers reinforces the importance of social media through online reviews, selected hotel attributes need to incorporate and provide information to aid the strategic planning process. In seeking to consider what salient hotel attributes to include in the model, this study acknowledges that hotels may





**Figure 1.** Research model.

Note: + indicates positive comments; - indicates negative comments.

seek to deliver excellence at every moment of truth. However, the guest experience can be rather complex, as it involves a diverse array of services and amenities (Crotts, Mason, and Davis 2009). Accordingly, the high investment cost, together with limited resources available to hoteliers during strategic decision making, makes it imperative to know what is appreciated by consumers together with the impact on performance.

To be within potential consumer's consideration set, the hotel products and services must provide a basic level of attributes. However, from a research perspective, there appears to be a wide and extreme heterogeneity in the selection of hotel attributes (Dolnicar and Otter 2003). The authors reviewed past approaches published between 1984 and 2000 in hospitality, tourism, and business journals and extracted 173 hotel attributes. Dolnicar and Otter (2003) categorize these into image, price value, hotel, and room. Previous research in the hospitality industry (e.g., Callan and Kyndt 2001; Choi and Chu 2001; Lockyer 2003) has identified attributes such as room cleanliness, convenience of location, value for money, and friendliness of staff as important for service quality. Albayrak and Caber (2015)

used importance-performance analysis and noted hotel attributes such as food and beverages, personnel, room, and beach as core items to concentrate upon. Ady and Quadri-Felitti (2015) in their study of the most important attributes to travelers when making a booking used the following hotel attributes: room, breakfast, service, wellness, Wi-Fi, food, cleanliness, amenities, and comfort. Interestingly, in their conclusion, they state that once a hotel becomes part of a traveler's consideration set, the hotelier should focus on those attributes that trigger a booking. These were Wi-Fi, food, rooms, and amenities.

The hotel variables selected for the study (see Figure 1) incorporate hotel attributes used in prior studies (Albayrak and Caber 2015; Ady and Quadri-Felitti 2015; Dolnicar and Otter 2003). The attributes cover three distinctive, logically related areas of the hotel. The first relates to physical aspects of hotel provision (grounds, building, ambiance, rooms and Internet). The second relates to the quality of food and drink, influenced by the menu and beverages. The final area relates to human aspects of service provision for the hotel, which is an important enough element to be considered alone.

TrustYou, a private German company offering online reputation management tools to the hospitality industry, provided data. The company has developed a semantic search engine for online evaluations and offers four key products: TrustYou Analytics (online reputation analysis and management), TrustYou Stars (search engine optimization from reviews), TrustYou Meta-Review (review summaries posted on travel and search sites), and TrustYou Radar (a mobile dashboard on hotel performance). TrustYou was founded in 2008 and is headquartered in Munich, Germany. The company has more than 100 employees and operates in 22 countries. It is a prominent company in the hotel sector online reputation management marketplace. It is particularly dominant in German-speaking Europe. It has more than 50,000 hotels among its customers, including Mövenpick, Accor Hotels, Sofitel, Arcotel Hotels, Best Western, Hard Rock, Linder Hotels and Resorts, Motel One, Petit Palace Hoteles, Rydges, Hotel Santika, and Trump Hotel Collection (TrustYou 2015).

TrustYou also made the user-generated online review scores available. The scores for positive and negative sentiment were created by TrustYou using their machine-learning algorithm (<https://github.com/trustyou>). The final scores were divided by the number of rooms in a hotel to ensure that the results are not influenced by hotel size. TrustYou aggregates customer online generated reviews for all Swiss hotels, and in 2010 included 68 evaluation platforms (see Table 2), such as TripAdvisor, HolidayCheck, and booking.com. This created a constraint on the variables used in the model as TrustYou collect data across the 68 evaluation platforms in a systematic manner, so that reports can be used by its clients.

## Performance

With regards to business performance previous studies have shown mixed results regarding the importance of hotel attributes (e.g., Dolnicar and Otter 2003; Sainaghi 2011; Yavas 2003), and a very limited number of studies have examined the role of online reviews when investigating the impact of a multiple set of hotel attributes on hotel performance (e.g., Phillips et al. 2015). Previous eWOM studies have used revenue per available room (RevPAR) (Anderson 2012; Blal and Sturman 2014; Scaglione, Schegg, and Murphy 2009) and occupancy rates (Levy, Duan, and Boo 2013), which are two leading hotel performance metrics. The selected variables for this study were hotel attributes that guests would rate (based on sentiment analysis of reviews) and two performance variables, namely RevPAR and Occupancy Rate. The major stakeholders of the sector provided hotel performance data: the Swiss Federal Statistical Office, Switzerland Tourism, and hotelleriesuisse, the major trade organization for the hotel industry.

## Valence of Reviews

The valence of reviews was measured using positive and negative comments on the hotel attributes. Investigating the impact of valence on hotel attributes reveals insights into the

**Table 2.** Overview of Online Platforms Aggregated by TrustYou.

Ab-in-den-Urlaub	MYTravelGuide
Atrapalo.com	NeckermannReisen.de
ATraveo.de	Opodo
Ayda.ru	Orbitz
Booking.com	Priceline.com
Ciao.co.uk	Qype.com
CosmoTourist.de	Qype.co.uk
CustomerAlliance	RakutenTravel
EBookers	Reisen.de
Expedia	Roomex
Falk	Schneehoehe.de
FastBooking.com	ThomasCook.de
Fodors.com	Tiscover.com
Google Places	TravBuddy
HolidayCheck.com	Traveluation
HolidayranKing.de	Travelocity.com
Holidays Uncovered	TravelPost.com
HolidayInsider.de	TripAdvisor
Hostelworld.com	Tripwolf
Hotels.com	Trivago.co.uk
Hotel.de	Trivago.de
Hotel-ami.de	TOPHotels.ru
Hotelcheck.de	Urlaub.de
HotelClub	VakantieReisWijzer.nl
HotelKatalog24.de	Varta Guide.com
HRS.de	Varta Guide.de
HRS.com	Venere.com
IgoUgo	Vinivi
Kayak.com	VirtualTourist.com
Lastminute.de	Votello.de
Lastminute.com	Weg.de
LateRooms.com	YahooTravel
Merian	Zoover.de
Monvoyager	4travel.jp

consumer's perceived service quality and potential purchase risks (Liu 2006; Sun 2012). Xie, Zhang, and Zhang (2014) argue that consumers of hotel services weigh positive reviews more than negative reviews, which would imply a positive impact of review valence on hotel performance.

This forms the basis for the following hypotheses:

*Hypothesis 1:* Positive sentiment about physical hotel attributes is positively related to hotel demand.

*Hypothesis 2:* Negative sentiment about physical hotel attributes is negatively related to hotel demand.

*Hypothesis 3:* Positive sentiment about food and drink is positively related to hotel demand.

*Hypothesis 4:* Negative sentiment about food and drink is negatively related to hotel demand.

*Hypothesis 5:* Positive sentiment about staff service is positively related to hotel demand.

*Hypothesis 6:* Negative sentiment about staff service is negatively related to hotel demand.

*Hypothesis 7:* Positive sentiment about hotel location is positively related to hotel demand.

*Hypothesis 8:* Negative sentiment about hotel location is negatively related to hotel demand.

## Mediation Effects

Attention has also been directed in the literature toward more concrete insights into the determinants of tourism performance (e.g., Assaf and Josiassen 2012). Thus, we sought to improve and explain the predictive nature of performance within our research model. We were also interested in examining the extent to which the key elements of sentiment and demand carried forward the effects of their antecedents. The results of such an analysis would enable us to examine the mediation effects of these variables. Thus, we posited the following hypotheses:

*Hypothesis 9:* The sentiment about hotel attributes on revenues is mediated by hotel demand: (a) positive sentiment about physical hotel attributes; (b) negative sentiment about physical hotel attributes; (c) positive sentiment about food and drink; (d) negative sentiment about food and drink; (e) positive sentiment about staff service; (f) negative sentiment about staff service; (g) positive sentiment about hotel location; (h) negative sentiment about hotel location.

*Hypothesis 10:* The effect of positive sentiment about hotel (a), grounds (b), building (c), ambiance (d) rooms, and (e) Internet on demand is mediated by positive sentiment about physical hotel attributes.

*Hypothesis 11:* The effect of negative sentiment about hotel (a), grounds (b), building (c), ambiance (d) rooms, and (e) Internet on demand is mediated by negative sentiment about physical hotel attributes.

## Research Methodology

### Hotel Sample

The sample consists of 442 hotels operating in Switzerland in 2010. Table 3 provides a summary of the sample data set.

According to the Swiss Tourism Federation (2010), there were 4,827 open establishments (in terms of being open for trading) out of 5,477 surveyed hotels for 2010. The sampling frame for our study comprises independent small and medium-sized hotels, who were members of *hotelleriesuisse*—the principal hotel association for the hotel sector in Switzerland, responsible for the Swiss hotel classification. In 2010, there were 2,196 member hotels of *hotelleriesuisse* representing roughly 60% of hotel beds in Switzerland (157,634 beds compared to an overall capacity of 275,193 hotel beds) and generating more than three-quarters of total overnight stays (*hotelleriesuisse* and SGH 2011).

**Table 3.** Summary of Data Set.

Swiss Hotel Data	
Number of hotels	442
Number of rooms	18,425
Number of beds	32,451
Number of positive reviews	63,026
Number of negative reviews	11,406
Total number of reviews	74,432

**Table 4.** Number of Hotels Participating and Swiss Average (2010).

Category	Hotels in Sample, n (%)	Hotels in Switzerland, n (%)
One-star	0	42 (1.9%)
Two-star	82 (19%)	261 (11.9%)
Three-star	166 (37%)	960 (43.7%)
Four-star	83 (19%)	443 (20.2%)
Five-star	25 (6%)	91 (4.1%)
Other categories	86 (19%)	399 (18.2%)
Total	442 (100%)	2,196 (100%)
No information		3,281
Swiss total		5,477

In total, as we can see in Table 4, only 40.1% (being 2,196/5,477) of all properties were given a category (star rating), with 338 being given no stars (i.e., other categories). The sample of 442 hotels represents 22.2% of the Swiss hotel industry. Two further limiting factors relating to performance data reduced the available sample size: obtaining RevPAR and occupancy data for 2010 for the hotels. Overall, the sample consists of 74,432 reviews, with 63,026 (80.6%) positive (+) reviews and 11,406 (19.4%) negative (−) reviews.

### Data Analysis

The research model was tested using PLS-PM in the XLSTAT software package (XLSTAT 2015). PLS-PM is a variance maximization structural equation modeling technique that makes no distributional assumptions for data samples (and is sometimes referred to as “soft modeling”). It has greater statistical power than covariance-based structural equation modeling and excels at testing complex, predictive models with formative indicators (mode B) and single-item measures (Hair et al. 2014). Since our research focuses on a complex model based solely on single-item formative indicators, the method is considered a suitable choice for our study.

In our study, it was necessary to employ single-item measures because of the nature of the TrustYou data set. Single-item measures, while having some drawbacks, can provide useful summative measures for unambiguous constructs (Bergkvist and Rossiter 2007; Wanous, Reichers, and Hudy

1997). Our single-item measures were created based on well-known hotel business metrics and the application of a standard sentiment analysis algorithm to visitor comments across the websites evaluated and can therefore be considered unambiguous. Since the constructs are formative, single-item measures, we were unable to conduct discriminant validity tests via Fornell and Larcker's (1981) method or cross-loadings (Chin 1998), or to assess internal consistency using reliability statistics such as Cronbach's alpha. However, we examined the condition index (Chin 1998; Duarte and Raposo 2010), which confirmed the absence of multicollinearity in our model: the condition index for each of our variables does not exceed the recommended ceiling of 30, the highest value being 20.079.

Since the principal objective of PLS-PM is prediction, the goodness of a theoretical model is not assessed using traditional metrics (e.g., goodness of fit in covariance-based structural equation modeling) but via the evaluation of the strength of each structural path and the combined predictiveness ( $R^2$ ) of exogenous constructs (Chin 1998; Duarte and Raposo 2010). According to Falk and Miller (1992), the level of acceptable predictiveness for  $R^2$  is 0.1. Thus, based on this criterion, all endogenous constructs in our model displayed an acceptable level of predictiveness, leading to a positive overall evaluation of the nomological validity of our model.

## Research Results

### Descriptive Statistics

Table 5 presents descriptive statistics for our sample of 442 hotels. The highest scoring maximum positive (+) hotel attributes were Service (11.357), Rooms (11.111), Location (9.980), and Food & Drink (9.000). In terms of mean positive (+) scores the three hotel attributes scoring highest were Rooms (0.798), Service (0.699), and Hotel (0.583). The three highest scoring maximum negative (−) hotel attributes were Rooms (5.893), Food & Drink (3.000), and Hotel (2.214). In terms of highest mean negative (−) scores, the three highest hotel attributes were Rooms (0.244), Hotel (0.088), and Food & Drink (0.084).

The highest scoring positive (+) hotel attributes support the observation that visitors value customer service, and if they are pleased will tend to write positive comments. In terms of the business dynamics of the hotel business the Room, Food and Drink and Location are also crucial areas that can lead to positive comments. However, the mean positive (+) scores did not follow the same pattern, with Rooms being followed by Service and then by Hotel. Rooms, Food & Drink, and the Hotel also dominated the maximum and mean negative (−) sentiment scores for the sample of hotel reviews.

### Testing the Research Model Using Partial Least Squares Path Modeling

We used a  $t$  test to examine the difference between the mean star rating of the sample ( $M = 2.532$ ,  $SD = 1.460$ ,  $n = 442$ )

**Table 5.** Descriptive Statistics.

Variable	Minimum	Maximum	Mean	Standard Deviation
Ambiance +	0	2.714	0.089	0.216
Beverages +	0	0.684	0.036	0.080
Building +	0	1.409	0.075	0.160
Food & Drink +	0	9.000	0.527	0.979
Grounds +	0	1.707	0.099	0.248
Hotel +	0	7.400	0.583	1.059
Internet +	0	2.286	0.052	0.164
Location +	0	9.980	0.474	0.961
Menu +	0	0.182	0.002	0.015
Room +	0	11.111	0.798	1.463
Service +	0	11.357	0.699	1.318
Ambiance −	0	0.267	0.010	0.026
Beverages −	0	0.214	0.006	0.022
Building −	0	0.786	0.022	0.067
Food & Drink −	0	3.000	0.084	0.222
Grounds −	0	0.324	0.013	0.037
Hotel −	0	2.214	0.088	0.180
Internet −	0	0.425	0.019	0.045
Location −	0	0.900	0.041	0.102
Menu −	0	0.167	0.001	0.010
Room −	0	5.893	0.244	0.535
Service −	0	0.745	0.055	0.097
Occupancy	4.805	100.000	49.539	19.672
RevPAR	3.091	464.745	84.007	66.435

and the mean star rating of the population ( $M = 2.622$ ,  $SD = 1.158$ ,  $n = 1995$ ), but found no significant difference ( $t = 1.411$ ,  $df = 2435$ ,  $p = 0.158$ ).

In order to gauge the adequacy of our sample for partial least squares path modeling, we conducted a post hoc power analysis using G\*Power 3.1 (Faul et al. 2007). The analysis ( $\alpha = 0.05$ ,  $1 - \beta = 0.8$ ) indicated that the sample ( $n = 442$ ) is adequate even for very small population effects (e.g., the effect size is  $f^2 \geq 0.018$  for demand and smaller for other endogenous variables).

Table 6 shows the statistical results of testing our research model using PLS-PM. The research model explains 31.7% of variance in Revenue (measured by RevPAR) and the relationship between Demand (measured by percentage occupancy) and Revenue is extremely significant ( $\beta = 0.543$ ,  $t = 14.286$ ,  $p < .001$ ). The research model explains a modest but acceptable level of variance in Demand ( $R^2 = 0.111$ ). This variance in Demand is explained by one significant construct, Hotel (+) ( $\beta = 0.359$ ,  $t = 2.079$ ,  $p = 0.038$ ), providing support for hypothesis 1. Positive comments about the hotel are the most significant determinant of customer demand. Notwithstanding, hypotheses 2 to 8 are not supported by the data.

Turning to the Hotel (+) construct, we note an  $R^2$  of 0.907. All five subfactors contribute toward explaining the variance in Hotel (+), with the strongest being Rooms (+) ( $\beta = 0.649$ ,  $t = 21.809$ ,  $p < .001$ ), Internet (+) ( $\beta = 0.217$ ,  $t = 10.894$ ,  $p < .001$ ),



**Table 6.** Test of Research Model.

Relationship	Path Coefficient	Standard Error	t	Pr >  t
Grounds + → Hotel +	0.054	0.016	3.344	0.001
Building + → Hotel +	0.133	0.022	5.924	0.000
Ambiance + → Hotel +	0.054	0.023	2.373	0.018
Internet + → Hotel +	0.217	0.020	10.894	0.000
Rooms + → Hotel +	0.649	0.030	21.809	0.000
Hotel +: $R^2 = 0.907$ ( $F = 845.910$ , $Pr > F < .001$ )				
Grounds - → Hotel -	0.130	0.025	5.137	0.000
Building - → Hotel -	0.106	0.037	2.839	0.005
Ambiance - → Hotel -	-0.009	0.024	-0.362	0.718
Internet - → Hotel -	0.036	0.030	1.184	0.237
Rooms - → Hotel -	0.715	0.045	15.954	0.000
Hotel -: $R^2 = 0.770$ ( $F = 291.520$ , $Pr > F < .001$ )				
Menu + → Food & Drink +	0.269	0.038	7.174	0.000
Beverages + → Food & Drink +	0.528	0.038	14.061	0.000
Food & Drink +: $R^2 = 0.430$ ( $F = 165.632$ , $Pr > F < .001$ )				
Menu - → Food & Drink -	0.141	0.044	3.189	0.002
Beverages - → Food & Drink -	0.476	0.044	10.724	0.000
Food & Drink -: $R^2 = 0.306$ ( $F = 96.582$ , $Pr > F < .001$ )				
Hotel + → Demand (Occupancy)	0.359	0.173	2.079	0.038
Hotel - → Demand (Occupancy)	-0.057	0.090	-0.638	0.524
Food & Drink + → Demand (Occupancy)	-0.037	0.097	-0.379	0.705
Food & Drink - → Demand (Occupancy)	-0.027	0.074	-0.368	0.713
Service + → Demand (Occupancy)	-0.261	0.187	-1.393	0.164
Service - → Demand (Occupancy)	0.104	0.062	1.669	0.096
Location + → Demand (Occupancy)	0.188	0.123	1.530	0.127
Location - → Demand (Occupancy)	0.074	0.071	1.041	0.299
Demand (Occupancy): $R^2 = 0.111$ ( $F = 6.728$ , $Pr > F < .001$ )				
Demand (Occupancy) → Revenue (RevPAR)	0.563	0.039	14.286	0.000
Revenue (RevPAR): $R^2 = 0.317$ ( $F = 204.086$ , $Pr > F < .001$ )				

and Building (+) ( $\beta = 0.133$ ,  $t = 5.924$ ,  $p < .001$ ), followed by Grounds (+) ( $\beta = 0.054$ ,  $t = 3.344$ ,  $p = .001$ ) and Ambiance (+) ( $\beta = 0.054$ ,  $t = 2.373$ ,  $p = .018$ ). Looking deeper, Table 7 provides an overview of the analysis of the impact and contribution of the five variables to the variance of Hotel (+). Rooms contribute the vast majority to variance: 66.9% of the  $R^2$  of positive voice of the hotel. This is followed by the Internet, contributing 16.2%, and Buildings, contributing 10.7% to  $R^2$ . Together, these three hotel attributes contribute 93.8% to the variance of Hotel (+). This is illustrated in Figure 2.

Overall, the results show that positive experiences regarding the hotel (Hotel +), as voiced through social media, have the greatest impact on hotel Demand (measured through occupancy rates) and subsequently Revenue (measured through

RevPAR). In other words, positive voice about the hotel is the most important of the constructs examined, driven by five sub-factors, with Rooms being the most important, followed by Internet, Building, Grounds, and Ambiance. Interestingly, none of the paths for negative reviews to performance were significant. Only positive reviews had a significant impact on performance through Hotel (+).

### Tests for Mediation Effects

To examine mediation effects, we ran Sobel (1982) tests. Scores for the Sobel tests (see Table 8) show that Hotel (+) is significantly mediated by Demand ( $Z = 2.054$ ,  $SE = 0.098$ ,  $p = 0.040$ ); that is, the effects of positive word of mouth about a hotel are strong enough to be carried through to revenues. This provides support for hypothesis 9a. However, since the direct paths for the other aspects of sentiment were not significant, hypotheses 9b to 9h are not considered in the analysis. Similarly, Rooms (+) ( $Z = 2.066$ ,  $SE = 0.113$ ,  $p = 0.039$ ), Internet (+) ( $Z = 2.038$ ,  $SE = 0.038$ ,  $p = 0.042$ ), and Building (+) ( $Z = 1.963$ ,  $SE = 0.024$ ,  $p = 0.050$ ) are all strong enough that the effects are mediated by Hotel (+) and carried through to Demand. Apparently, demand and revenues are driven by social chatter about good quality rooms, good Wi-Fi, and a nice building. This provides support for hypotheses 10b, 10d, and 10e but not 10a or 10c. Hypothesis 11 is not considered, since the direct paths in the model are not significant.

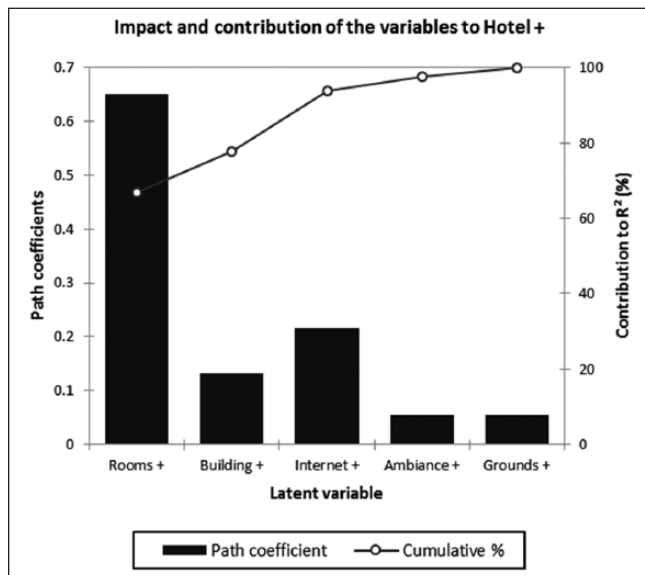
### Discussion and Conclusion

Although information-based businesses have been around for more than a century in physical format, digital business strategy creates new opportunities for value creation. The rise of social media presents opportunities for newer insights and for tourism practitioners to fine-tune their action and personalize their offerings. Online reviews allow customers to democratize content for sharing, which dramatically alter the relations between the firm and customers. Such shifts have allowed new forms of intermediaries that are able to create revenue streams. Social media online reviews can provide a cost-effective way of monitoring the customer voice and can be a competitive edge for even the smallest hotel.

The purpose of this research was to analyze in more detail how customer voice may affect hotel business performance by considering the antecedent effects of hotel attributes on hotel occupancy and RevPAR. We identify both theoretical and practical issues of the role hotel attributes play in consumers' minds. Knowing the attributes that lead to higher levels of performance will enable optimal decision making and a better allocation of valuable resources. We propose a model of hotel attributes that integrates aggregated TrustYou customer online reviews, arguing that by identifying performance-driving attributes, resources can be allocated purposefully—which consequently leads to higher business performance if not to the creation of competitive advantage.

**Table 7.** Impact and Contribution of the Variables to Hotel +.

	Rooms +	Building +	Internet +	Ambiance +	Grounds +
Correlation	0.934	0.732	0.679	0.654	0.380
Path coefficient	0.649	0.133	0.217	0.054	0.054
Correlation × path coefficient	0.607	0.097	0.147	0.035	0.021
Contribution to $R^2$ (%)	66.922	10.717	16.224	3.870	2.267

**Figure 2.** The Hotel (+) variable.

This study uses data from TrustYou, which searches, analyzes, and distills opinions from reviews written across the Internet. It uses online reviews to produce online reputation management tools to hotels, restaurants, and destinations. As well as reviews that can positively influence travelers' bookings, negative reviews can adversely affect booking intention. For the purposes of this study, we argue that it is strategically important for hotel managers to understand how via customer voice, various hotel attributes interact and affect business performance.

The analysis of data from 442 Swiss hotels suggests a complex relationship across a number of salient variables. Specifically, we identify a number of hotel attributes that can be used to predict hotel performance. While some studies have produced models linking some hotel attributes with performance via the development and measurement of social constructs (e.g., Dolnicar and Otter 2003; Millar, Mayer, and Baloglu 2012), we advance these studies by analyzing in more detail the antecedent effects of hotel attributes on hotel business performance based on the empirical voice of actual customers, that is, the valence of reviews. We focus on the impact of the valence of reviews as it strongly influences the

consumers' decision-making process when selecting a hotel for consideration. Price is no longer the sole consideration when consumers select a hotel (Noone and McGuire 2013); consumers will turn to reviews and ratings to inform their hotel purchase decision.

Both positive and negative reviews are a potentially important customer voice (Luo 2009), but prior studies either treat them in isolation, or not fully in terms of hotel performance (Chi and Gursoy 2009). By investigating the hotel landscape of an entire country, namely Switzerland, and by matching actual performance data with online reviews we contribute to the tourism literature by showing which hotel attributes matter the most for tourists in Switzerland. The data generated from 68 evaluation platforms, such as TripAdvisor, HolidayCheck and booking.com allowed a more comprehensive view on the impact of online reviews and thereby goes beyond studies that only use one source of online reviews (e.g., Xie, Zhang, and Zhang 2014; Blal and Sturman 2014).

As expected, and in accordance with prior theory of visitor needs in terms of attributes (see e.g., Mohsin and Lockyer 2010; Ramanathan and Ramanathan 2013), positive voice about the hotel room is a significant contributor to higher levels of performance. Interestingly, the Internet was ranked second. In other words, positive voice about the hotel is the most important of the constructs examined, driven by five subfactors, with rooms being the most important, followed by Internet and building (we acknowledge that this might be different today). In 2010, Wi-Fi infrastructure was not at the same level as today. Social media started to become popular during these years, so the need for connections became "urgent."

The findings provide some evidence for consumers' fear of being offline (FOBO). Hotel guests not only want Wi-Fi, but as Bulchand-Gidumal, Melián-González, and López-Valcárcel (2011) note, hotels can gain significant advantages by offering free Internet. This raises some pertinent issues, and given the paucity of academic research assessing consumers' perceptions of ICT use in hotels (Line and Runyan 2012) opens up some interesting lines of future enquiry.

Overall, the results show that positive experiences regarding the hotel (Hotel +), as voiced through social media, have the greatest impact on hotel Demand (measured through occupancy rates) and subsequently Revenue (measured through RevPAR). With these findings, this study contributes to the current debate on the effect of positive reviews on sales and revenues. Previous research has shown mixed results for the impact on consumer decision making (see, e.g., Duan, Gu, and Winston 2008; Vermeulen and Seegers 2009), with extant literature arguing that negative reviews influence consumers' decision making more than positive reviews (see Chevalier and Mayzlin 2006; Papathanassis and Knolle 2011). With regard to business performance, our research shows that only positive reviews have an impact on RevPAR, while the effect of negative reviews is insignificant. This

**Table 8.** Sobel Tests for Mediation.

Mediation Path (A → B → C)	a (A→B)	SE <sub>a</sub>	b (B→C)	SE <sub>b</sub>	Z (A→C)	SE	p
Grounds + → Hotel + Demand	0.054	0.016	0.359	0.173	1.768	0.011	0.077
Building + → Hotel + → Demand	0.133	0.022	0.359	0.173	1.963	0.024	0.050
Ambiance + → Hotel + → Demand	0.054	0.023	0.359	0.173	1.555	0.012	0.120
Internet + → Hotel + → Demand	0.217	0.020	0.359	0.173	2.038	0.038	0.042
Rooms + → Hotel + → Demand	0.649	0.030	0.359	0.173	2.066	0.113	0.039
Hotel+ → Demand → Revenue	0.359	0.773	0.563	0.039	2.054	0.098	0.040

might imply that the negativity effect was not strong enough for the single hotel attributes to be carried through to performance. This finding contributes to the ongoing debate between researchers such as Chevalier and Mayzlin (2006) and Duan, Gu, and Whinston (2008) showing that positive reviews increase product sales and revenues, whereas negative online reviews decrease revenues, and Chen, Wu, and Yoon (2004) arguing that online reviews are not correlated with sales. A negative relationship was, however, identified by Berger, Sorensen, and Rasmussen (2010), who found that negative online feedback leads to increasing sales.

As Switzerland attempts to recover its position in the global tourism market, the findings of this study present several opportunities at the regional, national, and international levels for hoteliers. The 26 cantons within Switzerland are of various sizes, ranging from Grigioni (7,105 km<sup>2</sup>) and Bern (5,959 km<sup>2</sup>) to many less than 300 km<sup>2</sup>. Arguably, many cantons are far too small to meet the challenges created by globalization. This presents a significant challenge to the Swiss government in terms of a national tourism policy.

Swiss hoteliers need to enhance their hotel product and service levels to obtain uplift in demand. This will provide an additional benefit such as an increase in market value, which could be attractive for local and overseas investors. With approximately 10% branded hotels, the real estate market will tend to be illiquid, which will be unattractive for potential investors (Schofield and Partners 2013). This can be illustrated by the fact that in 2010, the level of construction in the Swiss hotel and restaurant sector was only around CHF 800 million, which continued the downward trend from the 2007 peak of more than CHF 1100 million (Swiss Tourism Federation 2013). The results of this study provide some specific areas to consider when renovating a tired hotel product or when making an investment decision. Schofield and Partners (2013) state that from an investment perspective the Swiss hotel market can be categorized as resort/mountain hotels, Geneva/Zurich hotels, and other city hotels. Competition for hotels operating within these marketplaces will be different. In terms of hotel attributes, discerning travelers will be looking at the attributes included in this study, but will have differing expectations. Ideally, future research can delve into these three categories and incorporate traveler's characteristics into the research model and subsequent analysis.

The Swiss hotel market could be innovative and create products and services that are attractive for new markets such as bleisure (business and leisure) and family (friends and family). The business cities of Geneva and Zurich benefit from a favorable mix of business and leisure clientele and are ideally suited. Bridgestreet global hospitality (2014) "Bleisure Report" states that the majority of annual travel is for leisure, but 83% of their respondents use business trips to explore the city that they are visiting. They also state that hotels need to provide additional local services and really bring their brand to life. Switzerland, with its strong financial services sector, could help provide finance for many indigenous hotel units to develop brands that can design products and services for travelers' blurred lifestyles. The results of this study provide a platform to develop a bespoke offer that will translate into higher levels of performance.

The Swiss hotel model will help researchers and practitioners explain which aspects of visitor experience, as voiced through social media, have the greatest impact on hotel demand and hotel performance. Based on these insights, hotel managers can purposefully allocate scarce resources. Knowing that consumers complain about dissatisfactory services, hotel managers need to direct resources into the establishment of effective policies and processes in order to prepare for adequate responses to customers both online and on-site (Xie, Zhang, and Zhang 2014). Ramanathan and Ramanathan (2013) point out that high performance in terms of various service attributes is vital in order to achieve customer loyalty. Thus, managers should ensure that they provide the required resources and capabilities to perform various services. Yet, since we found that only positive reviews had an impact on performance, we recommend hoteliers to focus resources on hotel attributes that customers are happy with to maintain their quality, but also to address negative elements, even though a significant impact on performance was not found in our study. Listening and responding to negative reviews is important, for example, for reputational purposes, and previous studies have highlighted the importance of responding to negative reviews for driving hotel performance (Kim, Lim, and Brymer 2014; Chen and Xie 2008). This finding considerably influences the strategic thinking of hotel managers in that they should take advantage of positive reviews and take respective action to further advance those. We argue that managers should act proactively and purposefully manipulate

those key hotel attributes through the creation of dynamic capabilities and core competences. Because of the dynamic environment in which the resource-intensive tourism sector currently operates, strategic decisions need to be dynamic (Phillips and Moutinho 2014) and the allocation of resources should be informed by knowledge about real drivers of performance.

The study has a number of limitations. First, the research focuses on a sample of hotels in a developed European destination, Switzerland. The overall balance of star ratings in the sample is quite high. Further research is needed to ensure that the results are generalizable to other contexts, for example in developing economies. Second, the research is reliant on data collected using the TrustYou platform. This is a broad-reaching platform, but is not the only available source of visitor comments regarding hotels and so provides a specific perspective on the views of hotel customers. Third, the use of sentiment analysis for specific positive and negative categories of customer comment led to single-item formative variables being used in the study. This has limitations regarding the traditional measures for validity and reliability that can be used in confirmatory factor analysis. The research would benefit from the analysis of customer characteristics, and more current and longitudinal data covering further time periods.

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