

Article

Usefulness of Online Reviews of Sensory Experiences: Pre- vs. Post-Pandemic

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Abstract: As a result of globalization and other factors, periodic shocks to economic activity have become more frequent in recent years. How these periods of economic uncertainty affect different business sectors and industries has become an important emerging area of research activity. Sensory experiences are increasingly recognized as an important aspect of the customer experience. Likewise, online reviews and the usefulness rating given by review consumers are important factors in the consumers' purchasing decision-making process. How these factors are affected by periods of crisis is an underexplored area of research that this study addresses through the exploration and comparison of the perceived helpfulness of sensory experience online reviews, specifically in the hotel industry, before and since the COVID-19 pandemic. Primary data were harvested from the Booking.com website before and during the pandemic; 143,739 online reviews were analyzed using a keyword search based on six dimensions of hotel services to identify those reviews with sensory experience content. The analysis applied Herzberg's two-factor theory, where each service attribute was examined as both positive (satisfier) and negative (dissatisfier). Empirical analytical methods were applied to produce compelling findings. The findings indicate that the reviews of multisensory experiences affect the perceived value of a post both negatively and positively, respectively, and that the pandemic did not affect the relationship between reviews and the perceived helpfulness of the reviews. This study has both theoretical and practical implications for researchers and practitioners by applying and building on Herzberg's two-factor theory of online reviews in the hospitality sector during a period of crisis, as well as addressing a gap in the existing literature on how the pandemic affected the relationships between the online reviews of sensory experiences and their perceived usefulness. Practitioners may find the results useful in how they allocate their resources and focus during such periods to optimize their competitiveness.

Keywords: online reviews; sensory marketing; multisensory marketing; online booking; hotel booking; Herzberg; two-factor theory



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1. Introduction

Online reviews are consumer-generated evaluations of products or services [1] and have been found to increasingly affect sales and activity on e-commerce platforms [2,3]. Periods of economic uncertainty are becoming an increasingly relevant area of exploration. Such periods may be caused by military activity, social unrest, weather- and climate-related events and natural disasters, or by contagion events such as the COVID-19 pandemic of 2020. Consumers' behavior during periods of economic uncertainty is recognized as differing from that during periods of relative stability [4,5]. Notably, discretionary spending, such as leisure and tourism travel, tends to be negatively affected [6,7], while findings related to e-consumers' behavior during such periods lack consensus [8], largely due to the

increased online purchases of daily necessities. Understanding precisely how periods of economic uncertainty affect consumers' behavior is of critical importance.

The importance of the travel and tourism sector in driving economic activity has been well established. While this sector has been especially hard hit by the pandemic [9], it is also recognized as a critical sector in driving economic recovery subsequent to economic downturns [10]. The online reviews of the hospitality sector, a nexus of these areas of inquiry, have been found to be disproportionately more affected by service quality [11,12], particularly during the pandemic [13–15]. Due to the increased relative importance of the reviews of service quality, this article provides greater granularity, focusing on the relationships between online reviews and perceived helpfulness as a way to determine the effects of the pandemic on this one aspect of service quality.

The Internet era has allowed access to vast amounts of information, much of it peer-to-peer through social media, and nearly endless consumer choices enabled by e-commerce and Internet-enabled commerce. The nexus of these two phenomena is online reviews. Consumers have more information to sort through than ever before when making purchase decisions [16]. Online reviews can provide more information on products and services, reduce consumer uncertainty, affect purchasing intention and behavior, and ultimately exert tremendous influence on consumers [17]. ReviewTrackers (2018) report that 94% of consumers reported being convinced by online reviews to avoid a business, while Banerjee and Chua [18] and others found consumers increasingly rely on online reviews to guide their purchasing decisions [19–21].

Online reviews can be categorized broadly as positive or negative, with negative reviews getting more attention [22–24] and consistently being found to be more influential [25,26]. To further refine these categories, this study applies the findings of Johns and Howards [27], in which six dimensions of an experience can be reviewed both as positive and negative, meaning that the same experience may be both positive and negative, and the rating scales are separate. Positive reviews are known as “satisfiers”, while those aspects of a hotel experience that are reviewed negatively are known as “dissatisfiers”.

Creating an exceptional experience for guests at hotels has become highly difficult and increasingly important in the Internet era, where online reviews are common [28–30]. To compete successfully, hotels often resort to innovative strategies, among which is the integration of sensory stimulation into the overall guest experience. Known as sensory marketing, this creates a connection, often unconscious, between the guest experience and a positive perception. The online reviews of guests' hotel experiences contain information that can be examined through the frequency of keywords that indicate the presence of sensory experiences, both positive and negative, as well as overall satisfaction.

The examination of online reviews is confounded by several factors; for example, guests are more likely to post reviews if they find a hotel experience to be unsatisfactory. Guests who found a hotel experience to be highly positive are more likely to post online reviews than those who found the experience to be neither exceptionally positive nor negative, leading to a need for the in-depth examination of both ratings and posted comments.

The hotel customers posting reviews are referred to as generators, while those reading the reviews are known as consumers (of the reviews). Consumers can rate the reviews based on their perceived helpfulness of the reviews. Review helpfulness has been found to be a factor affecting the purchase intention of the review consumers [22,31,32].

This study uses text mining technology to extract data from the most extensive online hotel booking website in the UK, Booking.com, comprising over 31% of all reviews of hotels in the UK. The data were then analyzed to determine the presence of reviews containing words that refer to sensory experiences, the positive and negative nature of those reviews, the ratings posted by the same customers, and the perceived helpfulness of those reviews. This study examines how the sensory experience affects reviews, how those reviews of sensory experiences are perceived by consumers of the reviews, and how the consumers rate the helpfulness of reviews may be affected by a period of crisis.

It is important to note that while there is consensus within a few days or weeks regarding the date of the outbreak of the COVID-19 pandemic, the specific end date of the pandemic is not precise and varies by definition, region, and nation. For the purposes of this study, “post-pandemic” refers to “post-outbreak”, the period of time after the outbreak of the pandemic, during which time the pandemic was ongoing, although at differing levels in different parts of the world. Other related research reported that the pandemic changed the effect of consumers’ evaluations of hotel experiences, with service having an increasingly important role post-pandemic [33]. The relationship between how online reviews of sensory experiences and their perceived usefulness may be affected by periods of crisis has not been explored and is the subject of this study.

By extracting the reviews containing references to sensory experiences, and their subsequent helpfulness ratings both before and since the pandemic, this study is able to address this gap in the existing research and provide both theoretical and practical implications for researchers and practitioners by applying and building on Herzberg’s two-factor theory of online reviews in the hospitality sector during a period of crisis, as well as addressing a gap in the existing literature on how the pandemic affected the relationships between online reviews of sensory experiences and their perceived usefulness.

2. Literature Review

2.1. *Sensory Experiences in the Service Sector*

Sensory experiences result from sensorial cues, such as sound, including music, as well as color and scent [34], and can influence consumers’ purchase and consumption decisions [35,36]. In the service industry, creating a memorable experience is challenging, and the need for new strategies to create an innovative customer offering has been recognized by both practitioners and scholars in the service industry [37]. One approach is the creation of innovative service through the use of sensory stimulants, which is called sensory marketing [37,38].

Sensory marketing is a way to integrate sensory experiences into the service being offered, which then becomes a trigger in creating an unconscious consumer perception of the product or service [35]. For instance, Orth and Malkewitz [39] report on the role of vision and haptics in understanding product perception. Garlin and Owen [40] demonstrate the impact of auditory stimuli on customer feelings that can be used as a cue to understanding the customer experience. Huang et al. [41] reported on the relative importance of sensory experience triggers via online channels that are greater than in brick-and-mortar stores. Bolton et al. [42] identify the significant influence of sensory experiences on customers’ purchasing behavior. Despite the considerable volume of research on the topic, consensus regarding the relative importance of sensory reviews is lacking [43], suggesting that further exploration, especially on what drivers affect the perceived helpfulness of online reviews, is called for [44].

Sensory marketing has long been supported academically by psychological theories [45], but post-pandemic, it has taken on an even greater level of importance, particularly in providing sensory experiences that enhance the consumption setting to improve the well-being of consumers [46]. Therefore, a sensory experience plays a vital role in ensuring the differentiation of the product or service in a competitive market [47], and it helps create the customers’ holistic experience [48]. In this study, specifically the helpfulness of online reviews of the hotel industry is examined.

2.2. *Online Reviews in the Hospitality Industry*

Customers share their experience with products or services in the form of both text and numerical star ratings on the company’s website or third-party websites. The sharing of experiences online, electronic word of mouth (eWOM), continues to grow with both the length and frequency of online reviews, resulting in greater richness and influence on consumers’ decision making [49]. Reviews embrace indefinable features, such as the product or service quality, that cannot be observed before experiencing it, so customers who

want to avoid poor purchase decisions search for decisive and reliable information [50]. Reviews of hospitality sector experiences that contain sensory content have been found to be more credible [51].

The previous studies have used online reviews as an indicator of satisfaction or dissatisfaction in the hospitality industry [52,53] because a satisfying experience with a product or service leads customers to share details of the experience using online reviews [54]. When customers are dissatisfied with a product or service, they share more reviews about their disappointing experience with potential customers [54]. The motivation to write reviews is often altruistic, and customers who are inclined to write reviews are also more inclined to be influenced by reviews [55].

The development of text-mining technology allows scholars to identify various factors that influence customer satisfaction/dissatisfaction [53,56]. One of these factors is a multisensory experience. Spence et al. [57] examined customers' multisensory experiences in an online review context. The research shows that a multisensory experience leads to both positive and negative customer evaluations of a product or service. Lee et al. [58] describe the moderating effect of the multisensory experience on the relationship between evaluations and customer satisfaction in the hospitality industry. In the present study, text comments in online reviews are examined to extract the posts related to the sensory experience of customers and to investigate the effect of the sensory experience on customer (dis)satisfaction.

For review diagnosticity, review websites have used "review helpfulness" to measure how customers evaluate a review written by others in the online review context. Mudambi and Schuff [1] define review helpfulness as the perceived value of customers' online reviews in the purchase decision process. The related literature has studied the determinants of review helpfulness, such as review-related factors [59–62] and reviewer-related factors [63,64]. This paper explores the effect of the sensory experiences embedded in online reviews on perceived helpfulness.

2.3. The Impact of COVID-19 on Customer Experience in the Hospitality Industry

The COVID-19 pandemic affected every sector worldwide, with the hospitality industry being one of the hardest hit. There was a decline in the hospitality sector due to travel restrictions [65] and customers' reluctance due to uncertainty [66]. Additionally, the pandemic influenced customers' emotions, perceptions, and decision-making processes [67].

In the context of online reviews, researchers have investigated online customer reviews in the hospitality industry before and after the COVID-19 outbreak. Srivastava and Kumar [68] found changes in customers' preferences. Kutlubay et al. [69] found an increasing number of negative emotions in online reviews after the outbreak. The findings in the previous literature indicate a pattern shift in customer reviews, customer preferences, and behaviors, but evidence of the changing characteristics of customers pre- and post-pandemic has not been reported. For this study, it is assumed that the pre- and post-pandemic online reviews were created by customers with the same demographic and other characteristics. This study investigates how the COVID-19 outbreak influenced the relationship between the sensory experiences embedded in online reviews and customer satisfaction and perceived review helpfulness.

2.4. Hypothesis Development

Customers' satisfaction consists of the assessment of many different elements of products or services. The existing literature has indicated numerous service attributes that influence customer satisfaction in the hospitality industry, including room quality, employee service, and ancillary services [70–72]. Service attributes can be divided into satisfiers and dissatisfiers related to customer satisfaction or dissatisfaction, respectively [73]. There are two perspectives on how to differentiate the satisfiers and dissatisfiers. Some studies have found that satisfiers and dissatisfiers are two independent attributes and not on a bipolar

continuum [74,75]. However, Johns and Howard [27] found that an attribute could be a satisfier in one case, but a dissatisfier in another situation because there is no consistent pattern in the manner in which properties are presented across different industries. The absence of satisfiers does not mean increasing customer dissatisfaction [76]. This study follows Johns and Howards' [27] argument on satisfiers and dissatisfiers, assuming that each hotel attribute can be either satisfier or dissatisfier.

Using data from online reviews, Song et al. [11] reported that hotel customer satisfaction changed significantly during the pandemic, as did the factors that most influenced satisfaction levels, with service quality being the foremost influential factor. The same study reported that customers were more satisfied after the pandemic outbreak. Whether this result can be extended to sensory experiences has not been explored, leading us to H1a.

Mehta et al. [77], also using online reviews, found that hotel customer dissatisfaction during the pandemic was primarily related to the staff, service, and cleanliness. The cleanliness attribute is predictable and has been explored elsewhere; however, whether the dissatisfaction with staff (a service attribute) and other services carries over to sensory experiences on online reviews is unknown and is the foundation for H1b.

H1a. *Sensory information embedded in the positive aspect of an online review has a more positive impact on customer satisfaction after the COVID-19 outbreak.*

H1b. *Sensory information embedded in the negative aspect of an online review has a more negative impact on customer satisfaction after the COVID-19 outbreak.*

Researchers have investigated the perceived review helpfulness from various aspects, including determinants of helpfulness [78] and factors that influence online reviews in general [64]. When customers share their sensory experiences from their hospitality service experiences using online reviews, it is expected that the sensory experiences provide information richness, which influences the review helpfulness evaluation of potential customers.

Although the COVID-19 pandemic directly caused changes in the attitudes and behaviors of customers who experience the service, it may not have changed the level of standards used to evaluate others' reviews, and specifically has been found not to change the attributes (satisfiers/dissatisfiers) that most influence the expectations of the review producers or consumers [75]

There is a lack of consensus in the existing literature on related topics. It cannot be assumed that periods of crisis, such as the pandemic, will affect the perceived usefulness of online reviews of sensory experiences. According to the affective events theory [79], events such as the COVID-19 pandemic can trigger discrete emotions, which, in turn, influence people's attitudes and behaviors. In other words, the pandemic changed customers' attitudes and behaviors toward a product or service, including factors such as expectation level and evaluation standard, which, in turn, may have affected customers' satisfaction/dissatisfaction. For instance, the high perceived risk from the pandemic may have triggered a more severe standard for evaluating service in the hospitality industry, ultimately changing customers' expectations of multisensory experiences.

On the other hand, an important study by Mudambi and Schuff [1] found that review helpfulness can be viewed as a reflection of a review's diagnosticity, the perceived value of the review in the purchase decision-making process. This is consistent with the theory of information diagnosticity found in the literature [80,81]. Given that online reviews of sensory experiences have been found to provide greater value to review consumers, it is possible that there is no change in the relationship between review helpfulness and sensory information as a result of the pandemic. Therefore, it is necessary to investigate how the COVID-19 pandemic changed customers' expectations of their sensory experiences in the hospitality industry and how this change influences the level of customer satisfaction,

providing the foundation for the development of Hypothesis 3, indicated below; hence, the need to test this relationship is reflected in H3.

Review readers are potential customers who only experience the service indirectly. In other words, they are evaluating others' reviews, not the service itself. So, the perceived risk from the COVID-19 pandemic does not influence customers' attitudes toward an indirect experience of the service. Therefore, this study examines whether the COVID-19 outbreak changed the relationship between the sensory information embedded in online reviews and the level of review helpfulness.

H2a. *Sensory information embedded in the positive aspect of online reviews has positive and negative impacts on review helpfulness, respectively.*

H2b. *Sensory information embedded in the negative aspect of online reviews has positive and negative impacts on review helpfulness, respectively.*

H3. *The COVID-19 pandemic has had no direct impact on the relationship between sensory information and review helpfulness.*

3. Methodology

3.1. Data Description

To empirically test the moderating role of an unanticipated shock, COVID-19, in determining the impact of the interaction between a sensory service experience with different service dimensions on both online review generation and consumption, online reviews for all the hotels in London, England, from one of the leading online travel agencies (Booking.com) were extracted using vb.net.

Choosing a city or region for the study was a critical decision, balancing generalizability with the usual limitations of resources and time with meaningful findings to serve as a foundation for further research. For this study, London was selected as the data source location for several reasons. Hotels in the UK provide an extensive database and have a balance of domestic and international travelers, a balance of business and leisure travelers, and diversity among the international travelers, thus providing more meaningful findings from a single data source. Booking.com was selected as the data source because it is the most extensive review site and contributed 31.6% of the review volume in 2020 [82]. Additionally, the textual content of online reviews posted on Booking.com consists of positive ("pros") and negative ("cons") aspects of hotel services, reflecting the different aspects of service dimensions. These aspects contribute to an understanding of whether sensory service experiences, together with other elements of service evaluation ("pros" and "cons"), played a different role in shaping online review generation and consumption during the COVID-19 period. For online review generation, attention was paid to the review ratings, while for online review consumption, perceived review helpfulness was examined. Figure 1 shows an example of an online review posted on Booking.com.



Figure 1. Screenshot of an online review on Booking.com.

The dataset used in this study consists of 143,739 online reviews in English posted between January 2018 and November 2020. Table 1 shows the review ratings of the collected

reviews. Review ratings range from 1 to 10. More than 50% of the reviews have ratings greater than or equal to 8, and about 20% of the reviews have a rating of 10. Review ratings are used as the dependent variable for the online review generation process.

Table 1. Distribution of review ratings.

Review Ratings	Frequency	Cumulative Percent
$1 \leq \text{R.R.} < 4$	10,666	7.42%
$4 \leq \text{R.R.} < 6$	18,302	20.15%
$6 \leq \text{R.R.} < 8$	37,613	46.32%
$8 \leq \text{R.R.} < 10$	48,772	80.25%
R.R. = 10	28,386	100.00%

Notes: R.R. = review ratings.

Perceived review helpfulness is used as the dependent variable for the online review consumption process and has been sorted into the four categories shown in Table 2. Perceived review helpfulness is operationalized by the number of helpful votes. This approach is primarily used in the field of studying the economic value of online reviews [1]. As is evident from Table 2, about 88% of the reviews did not receive any helpful votes, while about 12% of reviews received votes for helpfulness.

Table 2. Distribution of perceived review helpfulness.

Perceived Review Helpfulness	Frequency	Cumulative Percent
P.R.H. = 0	126,834	88.24%
P.R.H. = 1	12,090	96.65%
$2 \leq \text{P.R.H.} < 10$	4783	99.98%
$10 \leq \text{P.R.H.} \leq 49$	32	100.00%

Notes: P.R.H. = perceived review helpfulness.

According to Ahn et al. [83], different types of travelers will generate differing review ratings. The generated review ratings affect perceived review helpfulness [1]. Therefore, the traveler type could also indirectly affect online review consumption. Due to this, traveler types are used as the control variable for both the online consumption and generation processes. As indicated in Table 3, the majority of the travelers are couples, or families with children.

Table 3. Distribution of traveler types.

Traveler Types	Frequency	Percent
Business Traveler	14,843	10.33%
Couple	50,866	35.39%
Family with children	39,000	27.13%
Groups of friends	12,064	8.39%
Solo traveler	26,966	18.76%

According to BBC News the first confirmed case of COVID-19 in London was recorded on 13 February 2020. Therefore, for this study, the data period (from 13 February 2020 to 30 November 2020) is considered the COVID-19 period. During the COVID-19 period, travel bans of varying rigidity and enforcement were in place in many places worldwide. The bans were lifted, and then reintroduced in some cases. Some countries did not put bans in place, while others were very strictly enforced. In the UK, the source of the data used in this study, travel bans varied from strict at the beginning of the COVID-19 period (as defined for this study), with mandatory isolation upon arrival, to relatively relaxed towards the end of the period, where international travel was limited by country of departure and proof of a negative COVID-19 test was required [84].

It is well known that COVID-19 affected online review generation and consumption [14]. Table 4 shows the changes in the review ratings and the number of helpful votes between the pre-COVID-19 and COVID-19 periods. Table 4 shows the comparison of review ratings and perceived review helpfulness between the pre-COVID-19 and COVID-19 periods. During the COVID-19 period, the review ratings decreased, and the perceived review helpfulness became lower than that in the pre-COVID-19 period. In the Empirical Analysis Section, the impacts of COVID-19 on review generation and consumption are explored, including a series of control variables.

Table 4. *T*-test.

Comparison	Review Rating	t-Stats	p-Value
Pre-COVID-19 period	7.84	61.50	0.00
COVID-19 period	6.98		
Comparison	Perceived Review Helpfulness	t-stats	p-value
Pre-COVID-19 period	0.20	27.18	0.00
COVID-19 period	0.09		

3.2. Study Design

Data were gathered through text mining to establish the relationship between different service dimensions and customer satisfaction. Based on Herzberg's two-factor theory [74], different service dimensions were identified as belonging to satisfiers and dissatisfiers. Through the analysis of the textual content of online reviews, it was possible to identify 12 specific service dimensions for satisfiers and dissatisfiers. Six dimensions are for satisfiers, and the other six dimensions are for dissatisfiers. To capture sensory service experience, a computer analytical program, Linguistic Inquiry and Word Count 2015 (henceforth LIWC), was employed.

Put forth in 2007 by Pennebaker et al. [85], LIWC is a text analysis program that tracks and tabulates words based on defined categories of psychologically meaningful definitions. The various dimensions used by LIWC have been extensively validated and are widely used in cases where a non-invasive approach is required for text generated at an earlier time. The empirical results of LIWC are widely accepted as a means to detect, identify, and, in some cases, measure meaning in various settings. Among other things, LIWC can be used to examine emotionality, thinking styles, relationships, and individual differences [86], making it an appropriate choice of tools for the present study.

3.3. Different Service Dimensions

Different service dimensions affect customer satisfaction differently. The pandemic affected some dissatisfiers/satisfiers in online reviews; sleep quality and Wi-Fi access changed, while those related to services remained unchanged [87]. This adds an additional control to the present study, meaning that the findings of the comparison between pre- and post-pandemic online reviews in the present study are not likely a result of changes to the attributes. Booking.com asks review posters to evaluate hotel services based on six dimensions: employee kindness, facilities, cleanliness, comfort, value for money, and location. The most frequently stated 300 words from the collected reviews were extracted using Python, and then sorted into the six dimensions used for service evaluation by Booking.com. Sorting the most frequently mentioned words into each dimension was conducted using manual coding. Manual coding was conducted by three experienced research analysts. During this independent process, if there existed some discrepancy in categorization between the encoders, the majority opinion was used.

Based on the word list of the six dimensions, each review was categorized based on whether the review contained a word that belonged to each dimension. Because the reviews on Booking.com include positive and negative aspects, the positive and negative

aspects of each review could have up to six specific service dimensions for each aspect. The six dimensions of the positive aspects reflect satisfiers, while those of the negative aspects reflect dissatisfiers. For example, if the positive aspect of a review included the word “bed” in the positive aspect of the review, the variable “facilities” was recorded as 1. In the absence of such a term, it is recorded as 0. These 12 variables are defined as binary variables. By using these dimensions, the types of service dimensions that lead to satisfaction and dissatisfaction can be identified. Table 5 shows an example of the word list for service dimensions.

Table 5. Examples of word list.

Employee Kindness	Facilities	Cleanliness	Comfort	Value for Money	Location
Staff	Room	Clean	Comfort	Price	Location
Reception	Bathroom	Atmosphere	Space	Pay	Walking
Manager	Parking	Hair	Noise	Money	Metropolitan
Professional	Lounge	Carpet	Quiet	Charge	Distance

3.4. Sensory Experience

To extract the sensory experiences with hotel services from online reviews, LIWC 2015 was employed [88]. This text analysis software program has been widely adopted to analyze textual characteristics of verbal and written speech in marketing and MIS [89,90]. Ransbotham [89] used LIWC to extract the positive and negative emotions reflected in online reviews and compare the reviews posted via mobile and non-mobile devices. Yin et al. [90] explored the impacts of discrete emotions on the perceived helpfulness of reviews and captured the anxiety and anger embedded in online reviews. LIWC uses a predefined word dictionary file to identify keywords. The dictionary consists of about 6400 words and word stems, including emoticons. Those words are used to produce almost 90 output variables (categories). After processing the text files, LIWC recognizes each file word by word. If a text file includes words belonging to specific categories, it counts the number of words belonging to the categories. With the calculation of the total number of words of each text, it calculates the percentage of the matched words with pre-defined word categories [88]. LIWC calculates the percentage of the matched words of a text (the number of matched words/the number of total words). This study specifically uses the following three categories: “see”, “hear”, and “feel”. Lee et al. [25] also used these categories to measure multisensory service experiences reflected in online reviews. The “See” category is comprised of 126 words, including view, saw, and seen. The “Hear” category consists of 93 words, such as listen and hear. The “Feel” category includes 128 words, including feel and touch [88].

3.5. The Quasi-Experimental Study Design

This study employs a quasi-experimental approach by constructing treatment and control groups. The treatment and control groups consist of online reviews which include the mention of a specific service dimension. The difference in the treatment and the control groups resides in whether a review contained the mention of sensory service experiences. The treatment group consists of online reviews reflecting at least one service dimension with sensory service experiences embedded in the online reviews. The control group constitutes online reviews reflecting at least one service dimension without sensory service experiences in the online reviews. To incorporate differential impacts of satisfiers and dissatisfiers, the treatment and the control groups were examined separately for the positive and negative aspects of online reviews. For example, the following review contains the facility dimension (“room”) and the sensory service experiences (feel—“frozen”) embedded in the negative aspect of the review. These types of reviews were categorized as the negative treatment group.

Service dimension with a sensory service experience (“Cons”)—“Due to COVID, I was not happy about the breakfast. Everything was pre-boxed, with no choices. The room was small. The first morning, we got frozen juice and no milk for the cereal”.

On the other hand, the following review only includes the facility dimension (“parking” and “room”) without a sensory service experience in the negative aspect of the review, which, therefore, belongs to the negative control group.

Service dimension without a sensory service experience (“Cons”)—“Construction going on. Getting from the parking garage to the hotel was annoying. The walls are a little thin in the rooms”.

The positive treatment and control groups are similarly constructed by consideration of whether the content of the positive aspect of a review includes both specific service dimensions and sensory service experiences or not. Table 6 shows the number of reviews for the treatment and the control groups of the positive and the negative aspects.

Table 6. Treatment and control groups.

Positive g.		Negative g.	
Positive treatment g. 25,944	Positive control g. 60,321	Negative treatment g. 33,800	Negative control g. 48,294

Notes: g. = group.

Table 7 provides summary statistics of the treatment and control groups used for empirical analyses. The average review rating for the positive group (positive treatment and control groups) is about 7.86. The average perceived review helpfulness is about 0.20. To capture the level of sensory service experiences, the three scores for “see”, “hear”, and “feel” were combined. The positive sensory value is 2.24, while the negative sensory value is 2.41. The average review rating for the negative group (negative treatment and control groups) is about 7.29, which is lower than that for the positive group. The average of perceived review helpfulness is about 0.21. The positive sensory value of the negative group is 2.11, while the negative sensory value is 2.58.

Table 7. Summary statistics.

Positive g.				Negative g.			
Variable	Mean	Min	Max	Variable	Mean	Min	Max
R.R.	7.86	1	10	R.R.	7.29	1	10
P.R.H.	0.20	0	23	P.R.H.	0.21	0	49
P-sensory	2.24	0	100	P-sensory	2.11	0	100
N-sensory	2.41	0	100	N-sensory	2.58	0	100

Notes: g. = group., R.R. = review ratings, P.R.H. = perceived review helpfulness, P-sensory = the summation of the scores for “see”, “hear”, and “feel” of the positive aspect of a review (positive sensory). N-sensory = the summation of the scores for “see”, “hear”, and “feel” of the negative aspect of a review (negative sensory).

4. Empirical Analyses

4.1. Model-Free Comparison

Table 8 indicates the results of the model-free comparison. In the case of the positive review group, the average rating of the treatment group is 8.19, while that of the control group is 7.72. The difference is statistically significant (p -value < 0.01). The difference in the review rating between the treatment and control groups is also significant for the negative group (6.99 and 7.50, respectively, p -value < 0.01), but the average review rating of the treatment group is lower than that of the control group. This means that multisensory experiences significantly positively affect customer satisfaction if the experiences are mentioned in a positive aspect, while they negatively influence satisfaction if the experiences are mentioned in a negative aspect.

Table 8. Model-free comparison.

Comparison	Review Rating			
	Treatment g.	Control g.	t-Stats	p-Value
Positive Group	8.19	7.72	31.19	0.00
Negative Group	6.99	7.50	32.59	0.00

Comparison	Perceived Review Helpfulness			
	Treatment g.	Control g.	t-stats	p-value
Positive Group	0.25	0.18	14.79	0.00
Negative Group	0.23	0.19	8.51	0.00

For perceived review helpfulness, the average helpful votes for the treatment group are greater than those for the control group in the case of the positive group (0.25 and 0.18, respectively, p -value < 0.01). This phenomenon is also confirmed in the negative group (p -value < 0.01). In subsequent empirical analyses, we examine whether these findings are confirmed when a series of control variables which affect the dependent variables, such as review ratings and perceived review helpfulness, were included in the model specifications.

4.2. Empirical Models

To test the proposed hypotheses, H1 and H2, the following linear regression and negative binomial models were used:

$$Review\ Rating_{ij} = \alpha + \beta_1 * Treatment\ g.\ ij + \beta_2 * Treatment * COVID - 19_{ij} + \beta_3 * COVID - 19_{ij} + \sum \rho_l * Control^l_{ij} + \theta_j + \varepsilon_{ij}, \quad (1)$$

$$\begin{aligned} Perceived\ Review\ Helpfulness_{ij} &= \exp(\gamma + \delta_1 * Treatment\ g.\ ij + \delta_2 * Treatment * COVID - 19_{ij} + \delta_3 * COVID - 19_{ij} + \sigma \\ &\quad * Review\ Rating_{ij} + \tau * Review\ Rating^2_{ij} + \sum \vartheta_l * Control^l_{ij} + \theta_j + \varepsilon_{ij}), \end{aligned} \quad (2)$$

where i represents a review poster, and j means a hotel. θ_j shows hotel-level heterogeneity. Either Huber/White/sandwich standard or clustered standard errors were used.

Specifically, to test the hypotheses on online review generation (H1a and H1b), a series of linear regression models for both the positive and negative groups based on the above Equation (1) was used. To test the hypotheses on online review consumption (H2a and H2b), a series of negative binomial models based on Equation (2) was used because the dependent variables are over-dispersed countable data.

4.2.1. The Interaction Impact of COVID-19 and Sensory Experiences on Review Ratings for Positive Group

Table 9 shows the empirical results of the linear regression models. The dependent variables are review ratings. In model (1), Huber/White/sandwich standard errors are used, while in model (2), clustered standard errors are used. Unlike model (1), the hotel-level heterogeneity model is used in model (2). The estimated coefficient of the treatment group for model (1) is significantly positive ($\beta_{Treatment\ group} = 0.442$, p -value < 0.01). This is also confirmed in model (2). The estimated coefficient is also significantly positive ($\beta_{Treatment\ group} = 0.297$, p -value < 0.01). The reviews of the positive treatment group tend to have higher review ratings than those of the positive control group. This means that interaction between the sensory service experiences and positive service dimensions has a positive impact on customer satisfaction. The interaction terms of treatment and COVID-19 turned out to be significantly positive ($\beta_{Treatment*COVID-19} = 0.095$, p -value < 0.01, $\beta_{Treatment*COVID-19} = 0.104$, p -value < 0.01, respectively). These estimated coefficients show that COVID-19 positively impacted the review ratings. COVID-19 plays a moderating role in determining the relationship between multisensory experiences and review ratings. While the coefficients of the positive service dimensions are all significantly positive, those

of the negative service dimensions are all significantly negative. This means that if the reviews include a specific service-related mention in the positive aspect, they have a positive impact on review ratings, while they will have a negative effect on review ratings if reviews contain a specific service-related mention in the negative aspect. The goodness-of-fit measure (R^2) for model (1) is about 12%, while that for model (2) is about 26%.

Table 9. Interaction impact of COVID-19 and multisensory experiences on review ratings for positive group.

Variable	Model (1) DV: Review Rating	Model (2) DV: Review Rating
Treatment Group	0.442 *** (0.015)	0.297 *** (0.018)
Treatment Group * Treatment COVID-19 Period	0.095 *** (0.041)	0.104 *** (0.046)
COVID-19 Period COVID-1	−0.832 *** (0.024)	−0.858 *** (0.038)
Positive Facility	0.117 *** (0.015)	0.102 *** (0.017)
Positive Staff	0.602 *** (0.015)	0.489 *** (0.017)
Positive Cleanliness	0.133 *** (0.029)	0.100 *** (0.032)
Positive Location	0.161 *** (0.01)	0.119 *** (0.017)
Positive Comfort	0.260 *** (0.019)	0.175 *** (0.020)
Positive Value for Money	0.370 *** (0.015)	0.289 *** (0.016)
Negative Facility	−0.610 *** (0.015)	−0.498 *** (0.018)
Negative Staff	−0.857 *** (0.026)	−0.824 *** (0.029)
Negative Cleanliness	−0.609 *** (0.023)	−0.510 *** (0.024)
Negative Location	−0.278 *** (0.018)	−0.282 *** (0.020)
Negative Comfort	−0.395 *** (0.018)	−0.377 *** (0.020)
Negative Value for Money	−0.249 *** (0.016)	−0.264 *** (0.018)
Traveler Type Dummy	Included	Included
Hotel-level Dummy	Not Included	Included
Intercept	Included	Included
Huber/White/sandwich estimator	Included	Not Included
Clustered sandwich estimator	Not Included	Included
R^2	12.21%	25.96%
Observations	86,265	86,265

Notes: ***/* indicates significance at the 1%/5%/10% level. Standard errors are in parentheses.

4.2.2. The Interaction Impact of COVID-19 and Sensory Experiences on Review Ratings for Negative Group

Table 10 indicates the empirical results of the linear regression models for the negative group. The dependent variables are review ratings, and the control variables for models (3) and (4) are the same as those of models (1) and (2) in Table 9. The estimated coefficient of the treatment group for model (3) is significantly negative ($\beta_{\text{Treatment group}} = -0.405$, $p\text{-value} < 0.01$). This was also confirmed in model (4) when we included the clustered sandwich estimator as well as hotel-level heterogeneity. The estimated coefficient is also significantly negative ($\beta_{\text{Treatment group}} = -0.371$, $p\text{-value} < 0.01$). The reviews of the negative

treatment group have lower review ratings than those of the negative control group. The interaction between COVID-19 and multisensory experiences in the negative aspect of online reviews also has a negative impact on the review ratings ($\beta_{\text{Treatment group}} = -0.159$, $p\text{-value} < 0.01$, $\beta_{\text{Treatment group}} = -0.174$, $p\text{-value} < 0.01$, respectively). Similarly with those in Table 9, the coefficients of the positive service dimensions in the positive textual content are significantly positive. However, those of the negative service dimensions are significantly negative. If the textual content of reviews contains a specific service-related mention in the positive content, it has a positive impact on review ratings, while it has a negative effect if the textual content of reviews includes a specific service-related mention in the negative content. The goodness-of-fit measure (R^2) for model (3) is about 12%, while that for model (4) is about 27%.

Table 10. Interaction impact of COVID-19 and multisensory experiences on review ratings for negative group.

Variable	Model (3) DV: Review Rating	Model (4) DV: Review Rating
Treatment Group	−0.405 *** (0.016)	−0.371 *** (0.017)
Treatment Group * COVID-19 period	−0.159 *** (0.043)	−0.174 *** (0.044)
COVID-19 period	−0.576 *** (0.040)	−0.559 *** (0.047)
Positive Facility	0.260 *** (0.018)	0.222 *** (0.019)
Positive Staff	0.631 *** (0.018)	0.516 *** (0.021)
Positive Cleanliness	0.363 *** (0.035)	0.285 *** (0.035)
Positive Location	0.318 *** (0.015)	0.251 *** (0.019)
Positive Comfort	0.484 *** (0.022)	0.349 *** (0.024)
Positive Value for Money	0.504 *** (0.018)	0.412 *** (0.020)
Negative Facility	−0.534 *** (0.01)	−0.418 *** (0.019)
Negative Staff	−0.884 *** (0.022)	−0.863 *** (0.026)
Negative Cleanliness	−0.567 *** (0.021)	−0.469 *** (0.023)
Negative Location	−0.173 *** (0.017)	−0.202 *** (0.019)
Negative Comfort	−0.290 *** (0.018)	−0.277 *** (0.020)
Negative Value for Money	−0.189 *** (0.016)	−0.225 *** (0.020)
Traveler Type Dummy	Included	Included
Hotel-level Dummy	Not Included	Included
Intercept	Included	Included
Huber/White/sandwich estimator	Included	Not Included
Clustered sandwich estimator	Not Included	Included
R2	12.41%	27.07%
Observations	82,094	82,094

Notes: ***/* indicates significance at the 1%/5%/10% level. Standard errors are given in parentheses.

4.2.3. The Interaction Impact of COVID-19 and Sensory Experiences on Review Helpfulness for Positive Group

In the following two sections, the role of sensory service experiences in online review consumption and perceived review helpfulness is tested based on Equation (2). Table 11 shows the empirical results for the positive group. Model (5) includes the review ratings and the squared review ratings as the control variables. The hotel-level heterogeneity and cluster standard errors in the model are likewise put forth in model (6).

Table 11. The impact of sensory service experiences on review helpfulness for positive group.

Variable	Model (5) DV: Review Helpfulness	Model (6) DV: Review Helpfulness
Treatment Group	0.262 *** (0.025)	0.251 *** (0.028)
Treatment Group * COVID-19 period	−0.075 (0.067)	−0.133 * (0.075)
COVID-19 period	−1.006 *** (0.062)	−0.900 *** (0.082)
Review Rating	0.298 *** (0.038)	0.361 *** (0.071)
Review Rating ²	−0.022 *** (0.002)	−0.026 *** (0.005)
Positive Facility	0.134 *** (0.024)	0.169 *** (0.026)
Positive Staff	0.064 *** (0.024)	0.076 *** (0.028)
Positive Cleanliness	0.142 *** (0.024)	0.111 *** (0.043)
Positive Location	0.356 *** (0.023)	0.241 *** (0.028)
Positive Comfort	0.164 *** (0.030)	0.126 *** (0.033)
Positive Value for Money	0.213 *** (0.024)	0.245 *** (0.028)
Negative Facility	0.126 *** (0.024)	0.168 *** (0.025)
Negative Staff	0.177 *** (0.037)	0.129 *** (0.040)
Negative Cleanliness	0.080 ** (0.036)	0.075 ** (0.036)
Negative Location	0.235 *** (0.027)	0.191 *** (0.029)
Negative Comfort	0.180 *** (0.028)	0.154 *** (0.030)
Negative Value for Money	0.261 *** (0.025)	0.249 *** (0.027)
Review Age	−0.213 *** (0.024)	−0.182 *** (0.043)
Traveler Type Dummy	Included	Included
Hotel-level Dummy	Not Included	Included
Intercept	Included	Included
Huber/White/sandwich estimator	Included	Not Included
Clustered sandwich estimator	Not Included	Included
Pseudo-R ²	2.04%	9.32%
Observations	86,265	86,265

Notes: ***/**/* indicates significance at the 1%/5%/10% level. Standard errors are given in parentheses.

The estimated coefficients for the treatment group are both significantly positive ($\delta_{\text{Treatment}} = 0.262$, $p\text{-value} < 0.01$, $\delta_{\text{Treatment}} = 0.251$, $p\text{-value} < 0.01$, respectively). This means that the sensory service experiences embedded in the positive textual content of

reviews contribute to improving the helpfulness of reviews, confirming H2a. On the other hand, the interaction between multisensory experiences and COVID-19 has no additional significant impact on perceived review helpfulness (H3). The estimated coefficients of the review rating are significantly positive ($\sigma_{\text{Review Rating}} = 0.298$, $p\text{-value} < 0.01$, $\sigma_{\text{Review Rating}} = 0.361$, $p\text{-value} < 0.01$, respectively), while those of the squared review rating are significantly negative ($\tau_{\text{Review Rating}}^2 = -0.022$, $p\text{-value} < 0.01$, $\tau_{\text{Review Rating}}^2 = -0.026$, $p\text{-value} < 0.01$, respectively), confirming the results of Mudambi and Schuff [1]. Interestingly, specific service-related mentions embedded in the textual comment are all significantly positive, regardless of whether a specific service dimension is mentioned in the positive or negative textual content. The pseudo R-squared value for model (5) is about 1%, while that for model (6) is about 9%.

4.2.4. The Interaction Impact of COVID-19 and Multisensory Experiences on Review Helpfulness for Negative Group

In this section, the role of sensory services experiences in the context of the negative group is explored. The model specifications in Table 11 are the same as those in Table 12. In model 7, the estimated coefficient of the treatment group is significantly positive ($\delta_{\text{Treatment group}} = 0.172$, $p\text{-value} < 0.01$). This means that if sensory service experiences are associated with specific service dimensions in the negative aspect of reviews, it has a positive impact on perceived review helpfulness. This positive impact is also confirmed in model (8). The estimated coefficient is significantly positive ($\delta_{\text{Treatment group}} = 0.177$, $p\text{-value} < 0.01$), supporting H2b. Similar to the results of Table 11, COVID-19 had no impact on the relationship between sensory information and review helpfulness. The estimated coefficient of the interaction between multisensory experiences and COVID-19 had no additional impact on perceived review helpfulness (H3). The review ratings have a positive relationship with perceived review helpfulness, while the squared term of review ratings is negatively related to perceived review helpfulness. All of the specific service dimensions have positive impacts on perceived review helpfulness, regardless of whether the dimension is mentioned in the positive or the negative textual content. The estimated coefficients for those service dimensions are all significantly positive. The pseudo R-squared value for model (7) is about 1%, while that for model (8) is about 9%.

Table 12. The impact of sensory service experiences on review helpfulness for negative group.

Variable	Model (7) DV: Review Helpfulness	Model (8) DV: Review Helpfulness
Treatment Group	0.172 *** (0.027)	0.177 *** (0.028)
Treatment Group * COVID-19 period	0.001 (0.065)	0.005 (0.068)
COVID-19 period	−1.067 *** (0.067)	−0.910 *** (0.092)
Review Rating	0.141 *** (0.034)	0.215 *** (0.057)
Review Rating ²	−0.008 *** (0.002)	−0.013 *** (0.004)
Positive Facility	0.094 *** (0.028)	0.135 *** (0.030)
Positive Staff	0.019 (0.027)	0.051 * (0.031)
Positive Cleanliness	0.175 *** (0.051)	0.167 *** (0.050)
Positive Location	0.356 *** (0.023)	0.245 *** (0.028)
Positive Comfort	0.191 *** (0.033)	0.152 *** (0.037)

Table 12. Cont.

Variable	Model (7) DV: Review Helpfulness	Model (8) DV: Review Helpfulness
Positive Value for Money	0.193 *** (0.027)	0.221 *** (0.032)
Negative Facility	0.091 *** (0.024)	0.137 *** (0.024)
Negative Staff	0.220 *** (0.032)	0.160 *** (0.037)
Negative Cleanliness	0.092 *** (0.033)	0.075 *** (0.034)
Negative Location	0.181 *** (0.026)	0.150 *** (0.027)
Negative Comfort	0.132 *** (0.027)	0.103 *** (0.029)
Negative Value for Money	0.242 *** (0.026)	0.224 *** (0.023)
Traveler Type Dummy	Included	Included
Hotel-level Dummy	Not Included	Included
Intercept	Included	Included
Huber/White/sandwich estimator	Included	Not Included
Clustered sandwich estimator	Not Included	Included
R2	1.87%	9.51%
Observations	82,094	82,094

Notes: ***/* indicates significance at the 1%/5%/10% level. Standard errors are given in parentheses.

Table 13 shows the summary of the findings and the results of hypothesis testing. Concerning online review generation, it was expected that during periods of economic uncertainty, sensory service experiences reflected in the textual content would have a positive impact on the review rating if the experiences were embedded in the positive aspect of the review (H1a). However, in the same circumstances, if the experiences were embedded in the negative aspect of a review, it would have a negative impact on the review ratings (H1b). These hypotheses are empirically supported. Regarding online review consumption, the expectation was that sensory service experiences would have positive impacts on perceived review helpfulness (H2a and H2b), but whether the experiences were embedded in the positive or negative aspects of a review would not be important. As was expected, the empirical results support both the hypotheses (H2a and H2b). In this case, the context within which the experience is reflected in a positive or negative aspect does not make any difference.

Table 13. Summary of hypothesis testing.

	Hypothesis	Test Results
Online Review Generation		
H1a.	<i>Sensory service experiences embedded in the positive aspect of a review have a positive impact on customer satisfaction.</i>	Supported
H1b.	<i>Sensory service experiences embedded in the negative aspect of a review have a negative impact on customer satisfaction.</i>	Supported
Online Review Consumption		
H2a.	<i>Sensory service experiences embedded in the positive aspect of a review have a positive impact on perceived review helpfulness</i>	Supported
H2b.	<i>Sensory service experiences embedded in the negative aspect of a review have a positive impact on perceived review helpfulness</i>	Supported
H3.	<i>COVID-19 has no impact on the relationship between sensory information and review helpfulness.</i>	Supported

5. Discussion and Implications

Within the broader context of service quality, this study investigates the relationships between the sensory experiences embedded in online reviews and customer satisfaction and perceived review helpfulness during periods of economic uncertainty, specifically the pandemic of 2020. The findings provide empirical evidence that multisensory experiences significantly affected customer satisfaction during the pandemic, with a negative effect if the experience was negative, and a positive one if the experience was positive. Further, the findings indicate that the pandemic has a positive impact on review ratings, playing a moderating role in determining the relationship between multisensory experiences and review ratings. In other words, if the reviews specifically mention a service in a positive way, there is a positive impact on the review ratings, and the opposite is also shown. If the reviews mention a negative aspect of a specific service, there is a negative effect on the review ratings.

5.1. Theoretical Contribution

From a methodological perspective, this study applied a combination of theories to a very specific topic, the relationship between online reviews of sensory experiences, and the perceived helpfulness of reviews before and during the pandemic. Therefore, the theoretical contributions are multifold. It expands research on big data analytics in the hotel industry during periods of crisis, contributes to the breadth of applications for Herzberg's two-factor theory, and compellingly applies LIWC to the field of online review analysis.

Previous research comparing hotel guests' experiences based on online reviews prior to and during the pandemic reported a little change in the guests' expectations [13]. The present study builds on those and other findings by using a larger sample (1923 vs. 143,739 reviews), a more generalizable sample, UK vs. China (where there was virtually no international presence during the pandemic period), and by applying a combination of Johnston's use of satisfiers/dissatisfiers and Herzberg's two-factor theory. Similarly, previous research by Kim and Kim [91] applied the eWOM (electronic word of mouth) theory to find that online postings on service-related factors significantly affected customer satisfaction, particularly during the pandemic. Still, that study did not explore the perceived helpfulness of reviews. Further, while online reviews in the hospitality sector have previously been examined using Herzberg's two-factor theory of satisfaction/dissatisfaction [52]. This study builds on Herzberg's theory in two aspects, first by applying it to big data derived from online reviews, which has not been conducted previously, and secondly by using LIWC as the method of analysis through which to gain an understanding of both the generation of online reviews that specifically concern only sensory-related experiences, consumption, and the perceived helpfulness of those reviews prior to and during a period of crisis that resulted from the COVID-19 pandemic. Finally, diagnosticity, the perceived value of the review is not affected by the shock of a crises event such as a pandemic can provide a foundation for further exploration of both diagnosticity and the crisis impact as well as the nexus of the two constructs in future research of the topic.

5.2. Practical Contribution

While some of the practical implications of this study may seem self-evident, confirmation of the relationships and effects can be valuable to practitioners seeking to optimize their operational activities during periods of economic uncertainty. Additionally, an effective response and implementation by practitioners could face some challenges and may be more effectively applied with awareness of the findings and insights into causality. Specifically, the insights for sensory marketing practitioners who experienced significant changes in online review trends during the pandemic could be helpful in ruling out possible triggers of those changes.

The findings also suggest that sensory experience-related online reviews continue to be perceived as helpful, whether positive or negative, during crisis periods, and, indeed, may be of even greater importance during such periods. This may provide motivation for

the hotel industry to prepare for periods of crises and insights into how best to respond accordingly in the allocation of resources for the management of online review content and sensory experience marketing.

Further practical contributions can be found in the finding that customers can indeed report high levels of satisfaction during periods of economic uncertainty and that those posts are perceived as helpful. This finding indicates that hotel managers can continue to focus efforts and resources on sensory marketing even during times of crises and can expect positive results. This is relevant, especially given the growing awareness of the important role of sensory experiences in the overall satisfaction of hotel guests, and the perceived helpfulness of online reviews containing sensory experience-related content.

In other words, the pandemic was likely not the cause of the changes in review helpfulness. Additionally, these findings reinforce the importance and value of sensory marketing in review generation, having both negative and positive influences, respectively.

This study can help hotel managers monitor the trends in online customer reviews and understand the subsequent perceived value of those reviews during periods of crisis and economic uncertainty. This is of particular relevance due to the likelihood of such periods resulting from climate- and weather-related events, as well as from geopolitical instability and conflict, becoming the “new normal” market conditions [92].

5.3. Limitations and Future Studies

This study has some limitations that suggest directions for future research. The data sample is limited to one website, and while the geographical location was carefully chosen to provide a relatively high proportion of international vs. domestic bookings and a balance of business and leisure bookings, the generalizability of the findings may be limited. Further, while this dataset is relatively large, an examination of the data, including, for example, different cultural or demographic groups, may yield interesting results.

While the use of LIWC as an analytical tool is well known and widely accepted, a different treatment of the same or a similar dataset using a different tool such as QCA might yield meaningful insights.

While an attempt was made to identify and control the other variables that may affect either the tone of online reviews, or the perceived usefulness of those reviews, there exists the possibility that one or more unknown or unidentified variable(s) may have influenced the findings.

Finally, this study focuses on the online review activity for hotels; other areas of the hospitality sector may have experienced different patterns and, if examined, would be an interesting area for future research.

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