

Online Review Response Strategy and Its Effects on Competitive Performance.

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***Highlights**

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- The quantity of managerial responses positively impact hotels performance.
- Managerial responses have a stronger positive impact on negative reviews.
- A defined response strategy is more effective than no strategy.
- Having a certain level of responses is more effective than not responding.
- A selective response strategy is more effective than responding to all reviews.

1 Online Review Response Strategy and Its Effects on Competitive Performance.

2

3 Abstract

4 Online reviews have transformed consumer behavior in information searching and
5 sharing. Their growing popularity has enabled new differentiation strategies for lodging
6 operators. More subtly, online review systems have forced hotel managers to compete
7 through the effective use of information systems that they have not created or purchased.
8 Therefore, managers in the tourism industry must adapt to the widespread use of external
9 systems, incorporate them in their strategy and evaluate their effects.

10 This study focuses on the impact of managements' quantity and quality of usage of online
11 review systems. Our findings show that managerial response quantity positively impacts
12 hotels' competitive performance. Moreover, responses have a stronger positive impact
13 when they address negative reviews. We evaluate four response strategies and find
14 significant performance differences among them. Our finding demonstrates the
15 importance of proficiency in external information systems use because performance
16 differs by "how" the system is used – not only "how much."

17

18 Keywords: online review; managerial response; quantity of response; quality of response;
19 response strategy

1. Introduction

Travel is one of the most expensive items purchased regularly by households, and it represents a significant proportion of individual's annual budget. Travel budgets also represent a significant expense for many corporations. Tourism and travel products (e.g., hotel rooms) are experience goods (Nelson 1970) where customers must purchase and utilize the service to ascertain its quality. That is, unlike search goods which the customers have an opportunity to evaluate before purchasing, hotel accommodation has always been impossible to "test" a priori. Experience goods are therefore characterized by a disproportionate importance of reputation which is used as a proxy for gauging quality prior to consumption (Nelson 1970). The importance of brands is widely recognized in the hotel industry and it has been one of the historic drivers of industry consolidation (Prasad and Dev 2000).

While the nature of travel services as experience goods has not changed, the continuing evolution of Information Technology (IT), and the widespread adoption of the Internet, contributed to virtualizing the information gathering process (Overby 2008). For example, the Internet has enabled the virtualization of tourism information search with dramatic changes in consumers' behavior (Buhalis and Law 2008) and the strategic balance of power between operators and intermediaries. The success of alternative accommodation arrangements, such as AirBnB, is arguably enabled by the digitalization of trust and reputation enabled by the IT. Social media and opinion platforms today are mainstream communications media in the tourism industry (Schmidt et al. 2008). Having virtualized the information search process, IT shifted the source of hotel information from traditional intermediaries and operators, to two categories of internet-based entities: (1) online travel agencies (e.g., Expedia) and, (2) online review specialists (e.g., TripAdvisor, Oyster). Online reviews are evaluative statements, written by actual or potential customers, available to end user and institutions via the Internet (Stauss 2000). They represent a critical information resource enabling prospective hotel guests to leverage the experience of other travelers in their selection process (Levy et al. 2013).

Recent industry data indicates that about 53% of travelers would not make a reservation until they read hotel online reviews and 77% of prospective guests report reading reviews

1 before they choose a hotel either “always” or “usually” (TripAdvisor 2014). The
2 academic literature shows that positive online hotel reviews enhance customers’ trust in
3 the hotel (Sparks and Browning 2011) resulting in improved financial performance (Öğüt
4 and Onur Taş 2012).

5 One critical, yet understudied, characteristic of modern online review systems is the
6 ability of operators to respond to guest reviews. This feature enables managers to join the
7 conversation about their products or services by responding publicly to online comments.
8 Thus, online review systems are socio-technical artefacts (Silver and Markus 2013) that
9 mediate the interaction between the firm and its customers. The ability to respond affords
10 the hotel managers an opportunity to further enhance the hotel performance by better
11 utilizing this online communication channel. Yet, despite the potential value offered by
12 response features, there is a lack of research focusing on response management strategies
13 in the hotel industry (Abramova et al. 2015). In this paper, we focus on the question of
14 how profit-maximizing hotel operators should respond to online reviews

15 Practicing managers have long intuited that partaking in the conversation is important.
16 An early industry study by TripAdvisor shows that responding to online reviews
17 improves customers’ likelihood of recommending a hotel by more than 20% (Barsky and
18 Frame 2009). However, there is a lack of research that rigorously and empirically
19 classifies and evaluates response management strategies (Liu et al. 2015). We pursue the
20 question by conceptualizing online reviews platforms as socio-technical artefacts that
21 virtualize the communication process between the customers and the hotels. We
22 categorize and analyze firms’ online review response strategies in terms of the quantity
23 and quality of online review system use. Our results extend previous work on the effect
24 of review valence and review quantity on hotel performance. More importantly, ours is
25 the first study to measure the competitive performance effect of managerial responses to
26 online reviews. Our contribution is in the empirical demonstration that hotels benefit
27 from both the quantity and quality of online review systems use. Specifically, those
28 hotels that embrace externally developed online review system to respond to customer
29 comments display superior competitive performance, and this effect is stronger when the

1 hotel uses the system to address negative comments. Finally, we also demonstrate the
2 comparative effect of four different classes of response strategies.

3 The paper is organized as follows. In the next section, we introduce our theoretical
4 framework and discuss previous literature on online reviews and management
5 responsiveness. We then introduce the context, methods and data used in our work. We
6 conclude by reporting and discussing our findings.

8 2. Theoretical Framework

9 2.1. Online Reviews

10 The literature shows that online consumer reviews have a significant influence on travel
11 information search and product sales (Duan et al. 2008; Xiang and Gretzel 2010; Mauri
12 and Minazzi 2013). In the hotel industry, for example, online hotel reviews increase
13 customers' awareness of the hotel and enhance hotel consideration in the customers'
14 mind (Vermeulen and Seegers 2009). High review scores convey: (1) product quality and
15 (2) social validation (Cialdini 2000). The research has reached consensus on the finding
16 that higher review scores increase sales (e.g., Chevalier and Mayzlin 2006; Sparks and
17 Browning 2011), while negative reviews are known for having a negative impact on
18 customers' attitudes (e.g. Lee et al. 2008). Prior research has also established that the
19 total number of reviews a product or service receives leads to higher sales and improved
20 brand reputation (e.g., Amblee and Bui 2011). While not the focus of our work, we seek
21 to establish that the same relationships hold in our context. Thus, we hypothesize:

22 H1a: Cumulative review scores are positively related to firm's competitive performance.

23 H1b: The total number of the online reviews positively impacts the firm's competitive
24 performance.

2.2. Firm Responsiveness

An online review system is an IT-enabled customer service system (Lui and Piccoli, 2016) that, because of the reach capability of information technology (Overby 2008), has the characteristics of a broadcast communication medium. The firm can utilize such a communication channel to collect intelligence and to respond to consumers' comments. Managerial response is one of the functionalities of the online review systems used for the support of customer relationship, reputation and brand management (Van Noort and Willemsen 2012; Baka 2016). We define managerial response as an answer posted on behalf of a tourism operator by its employees, addressing a specific comment contributed by a guest. Traditionally, customers interact with a few frontline employees during the service encounter, and typically develop an overall image of the emotions that members of a given organization will display (Sutton and Rafaeli 1988). Given that managerial response is publicly available online and will be viewed by potential customers, readers of online reviews can now form a similar perception of the firm's customer orientation strategies without physically interacting with employees. They do so by reading management responses rather than interacting first hand with the staff. In other words, while hotel services remain largely an experience product, perspective guests can vicariously "test it" by reading other guest comments and managerial responses. A positive link exists between a service-oriented business strategy and company performance. For example, managers respond to negative reviews, in some situations, to ensure to customers that the experience described in the negative reviews is unlikely to be repeated (Chevalier et al. 2016). In the absence of much academic literature there is some evidence of the importance of managerial responses from consulting firms. For example, analyzing a survey with 12,225 global consumers, PhoCusWright (2013) reported that over half of the respondents are more likely to book a hotel that displays managerial response compared to a hotel that does not. However, this work does not explain how or why managerial responses produce their effects.

Early academic research in this area suggests that managerial responses positively impact subsequent review rating and review volume, especially in the case of unsatisfied customers (Gu and Ye 2014). More importantly, archival research using TripAdvisor data

shows that providing timely and lengthy responses to reviews enhances the hotels' future financial performance (Xie et al. 2017). We borrow the concept of usage quality from the information systems literature, which claims that the quantity of usage alone does not guarantee the best outcomes. Quality of system usage (i.e., effective use of the system) is crucial to obtain maximum benefits of the system (Burton-Jones and Grange 2012). That is, ineffective usage of the system (low system usage quality) wastes firm's time and resources without satisfying the objectives of system utilization (Bevan 1995). We thus theorize that, at the firm-level, managerial responses to online reviews reflect the firm's underlying capability in using online review systems. In other words, the emergence of social media and user generated content has forced hotel operators to develop the ability to manage the hotel's reputation online, engage customers, address customers' concerns, and restore customer satisfaction (Xie et al. 2016). The hotels that are able to develop such capabilities, send a credible signal to potential guests, that the management team is reading and responding to the suggestions and comments of their customers. It is such a signal that stimulates future reviewing activities and fosters communications between the customers and the hotels (Chevalier et al. 2016; Wang and Chaudhry 2017). When the hotels start responding to reviews, they receive fewer but longer negative reviews because the customers are willing to invest the extra effort to provide more details in the reviews (Proserpio and Zervas 2016). In summary, managerial responses are the manifestation of the operator's capability to utilize an online review system to implement their service-oriented business strategy.

2.2.1. Quantity of Responses

Information systems theory predicts that the benefits of new sociotechnical systems adoption accrue to those organizations that utilize it (Silver et al. 1995). Previous research has established a direct link between systems usage and firm performance (Devaraj and Kholi 2003). With the emergence of online review systems and their opening of a managerial response channel, firms have the opportunity to use the system to contribute new information about their product or service. Customers perceives managerial responses as an indicator of the fact that the firm cares about customer service

(Lee and Hu 2005). Thus, the presence of a managerial response conveys an important message of the firm's customer-orientation strategy and is correlated with greater sales and improved satisfaction of complaining customers (Gu and Ye 2014). Those organizations that recognized the nature of online review systems as broadcast channels and their role in customer decision-making devote organizational resources to its use. As a consequence, managerial response correlates with increased hotel ratings and review volume on TripAdvisor (Xie et al. 2016). We propose that there is a direct link between online review systems use and financial performance.

H2: The cumulative percentage of managerial response to online reviews is positively related to the firm's competitive performance

2.2.2. Quality of Responses

While recent academic research has begun to investigate the relationship between managerial response and hotel financial performance, no work to date has investigated the relative effect of different response strategies. In other words, while managerial response in online review systems is a type of digital firm competence, there is no work to date mapping the impact of this competency on hotels' competitive performance. We argue that different response strategies are indicative of different degrees of competence by the hotel in adapting to the emergence of online review systems. Thus, they result in different competitive performance outcomes. Information systems scholars have empirically investigated the link between quantity of system usage and firm performance. Conversely, the role of quality of system usage has proven elusive (Sabherwal and Jeyaraj 2015). Burton-Jones and Grange (2012) defined effective use as "using a system in a way that helps attain the goals for using the system" (p.2). This characterization provides a general definition, which can be applied to any context and level of analysis. However, it lacks specificity. In the context of online review systems, the quality of use relies on the firms' capability to utilize the information in the system effectively and produce responses to help attract more customers. Effective information use is defined as "the extent to which information provided by the organization's information systems is successfully utilized to enable and support its business strategies and value-chain

activities” (Kettinger et al. 2013). Building on these definitions, we describe the quality of review system usage as the extent to which the firm employs the online review system to enable its customer orientation strategy. Quality of usage stems from the firms’ ability to optimize its resource allocation to the managerial response activity.

The online review literature has demonstrated the disproportionate impact that negative reviews have on user decision-making. Specifically, there is an inverse relationship between review rating and review diagnosticity, with negative reviews perceived as significantly more helpful by readers (Archak et al. 2011). Moreover, negative reviews have a greater effect on customers due to the “negativity bias.” The bias leads customers to pay more attention to negative information than positive inputs (Vaish et al. 2008). Because they counterbalance the negativity bias, specific management responses to negative online reviews engender more trust and deliver higher perceived communication quality than generic responses (Wei et al. 2013). It follows that managerial response should have the greatest impact when it addresses negative online reviews. In other words, on average, the positive impact of managerial response on competitive performance is stronger when the review rating is lower. Formally:

H3a: The cumulative review scores moderates the relationship between cumulative percentage of managerial response to online reviews and firm’s competitive performance

One aspect of quality of usage is captured by the prioritization of resource allocation toward negative reviews. However, such conceptualization does not capture the variety of response strategies the firm may enact. We posit that the quantity of managerial response impact firm performance (H2), and responses will have the greatest impact when addressing negative responses (H3a). However, a firm can enact a range of response strategies. Most research in the field has analyzed guests’ perceptions of the response strategies hotels use to address negative reviews (e.g., Lee and Song 2010; Lee and Cranage 2012; van Noort and Willemsen 2012; Treviño and Castaño 2013; Abramova et al. 2015). These works address the effects of a combination of the following strategies:

- 1 • Confession/Apology strategies: The managers politely recognize and apologize for
2 the situation but do not offer compensation or follow up actions (Treviño and Castaño
3 2013, Abramova et al. 2015).
- 4 • Changing/Accommodative strategies: The managers politely recognize the situation
5 and explain how they will redress the situation for future occasions. These strategies
6 encompass any form of apology, compensation, and/or corrective action (Lee and
7 Song 2010, Treviño and Castaño 2013).
- 8 • Denial/Defensive strategies: The managers deny the existence of the negative
9 experience mentioned in the review, deny responsibility for the negative events, and,
10 sometimes attack the customers who leave the negative reviews. The managers
11 disagree with the negative statements either directly by saying “I do not agree”, “It is
12 not true” or indirectly by providing counterarguments to show that the truth is
13 different from the events described in the negative reviews (Lee and Song 2010,
14 Treviño and Castaño 2013, Abramova et al. 2015).
- 15 • Excuse strategies: The managers introduce uncontrollable causes of the negative
16 event as an explanation to distance themselves from the responsibility for the incident
17 or to shift the blame to a third party (Weiner 2000, Abramova et al. 2015).
- 18 • No Response strategies: The managers offer no response to the negative comments or
19 take no overt action with the purpose of separating themselves from the negative
20 events by remaining silent in the online review platforms (Lee 2004).

21
22 The findings of this research in laboratory settings, suggest that managerial responses to
23 negative reviews increase customers’ trust toward the firm (Sparks et al. 2016). That an
24 accommodative response strategy to negative reviews has a more positive impact on
25 customers’ evaluation of the company, compared to a defensive response strategy or a no
26 response strategy (Lee and Song 2010). That unsatisfied customers expect
27 accommodative response from the hotel, when they strongly perceive that the causes of
28 the negative event are controllable by the hotel (Coombs 1999). This approach can reduce
29 feeling of aggression (Conlon and Murray 1996), which in turn leads to favorable
30 evaluation of product or service providers. More specifically, a recent study of response

1 strategies on Airbnb shows that when customers' complaints are related to a factor
2 controllable by the firm (e.g., cleanliness), a confession/apology strategy results in higher
3 customers' trust toward the firm while an excuse strategy will reduce trust. On the other
4 hand, when the complaints are beyond the control of the firm, a confession/apology
5 strategy or an excuse one positively influence the customers' trust, while a denial strategy
6 will have a negative effect (Abramova et al. 2015). Finally, a no response strategy may
7 risk allowing negative information about the company to stand unchallenged, which in
8 turn may damage the company's reputation and cause potential reputation damage and
9 consequent business loss in the future (Chan and Guillet 2011). As these strategies
10 studied in the past mainly concerns negative online reviews, very little research to date
11 examines empirically the managerial response strategies to all of the reviews present on
12 the online review systems. Moreover, no empirical research to date has formally
13 evaluated the impact of different response strategies on the competitive performance of
14 the hotels adopting them.

15 Given the paucity of research on this subject we abstract and categorize response
16 strategies empirically. Specifically, we identify the following four managerial response
17 archetypes:

- 18 • No response strategy (NRS): the hotel never addresses any of the guests' online
19 concerns. The NRS is the least costly approach to online review systems usage since
20 the hotel devotes zero resources to the effort.
- 21 • Strategic customer orientation strategy (SCO): the hotel selectively responds to
22 extreme customers' comments (the online reviews with the lowest and highest
23 evaluations).
- 24 • Full response strategy (FRS): the hotel responds indiscriminately to all guest
25 comments in an effort to signal its attention to all customers, regardless of their
26 comments.
- 27 • No strategy (NS): the hotel displays no discernible response strategy and managers
28 address customer comments seemingly at random.

1 When a hotel has a clearly defined managerial response strategy, customers can structure
2 their expectation of accommodation experience based on the customer-orientation
3 strategies the hotel implemented. Without a clearly defined pattern of managerial
4 response, it is difficult for prospective guests to create a perception of the hotel and to
5 vicariously test the quality of an experience good (e.g., hotel rooms) before consumption.
6 Therefore, we propose:

7 H3b: A defined response strategy (SCO, FRS and NRS) has a stronger positive effect on
8 firm's competitive performance than the no strategy (NS).

9

10 The presence of managerial response creates a dynamic and interactive communication
11 between the hotels and the customers. This two-way communication reduces the issue of
12 information asymmetry for experience goods (Litvin et al. 2008; Xie et al. 2014). Having
13 developed a response strategy signals the operator's care for guests and service quality.
14 Previous work shows that this signaling effect leads to improved review valence, number
15 of reviews and hotel ratings (Li et al. 2017). As a consequence, we expect this approach
16 to also reflect in superior competitive performance of the hotel as compared to a no
17 response strategy. Therefore, we propose:

18 H3c: The effect of a strategy with different levels of managerial response (CSO and FRS)
19 on firm's competitive performance is stronger than the effect of a no response strategy
20 (NRS).

21

22 Customer reviews display a J-shaped distribution due to purchasing bias (i.e., the
23 prospective customers with lower valuations are less likely to purchase the product) and
24 underreporting bias (i.e., the customers with extreme ratings are more likely to write
25 reviews than the ones with moderate reviews) (Hu et al. 2009). Rational people react to
26 these two biases by paying more attention to extreme reviews compared to moderate
27 reviews and even more attention to extreme negative reviews to avoid making mistakes
28 on product choice (Hu et al. 2009). On the other hand, responding to positive reviews
29 publicly recognizes customers' compliment and creates a positive emotion in the hotel's

1 online interactions with customers (Dickinger and Lalicic 2014). A template response
2 that simply shows gratitude to customer online compliments when the customers write to
3 express their positive feelings about the experience can enhance future customers'
4 attitudes (Deng and Ravichandran 2016). It signals that the hotel care about showing
5 appreciation of customers' business and experience more than just fighting the negative
6 reviews. In addition, when the management provides a personalized response to altruistic
7 positive reviews (the ones that providing knowledge sharing benefits to other future
8 customers), customers perceive higher usefulness of the response and are more likely to
9 agree with the compliment to leave a positive comment. As a result, the managerial
10 response will have a positive influence on future review valence (Deng and Ravichandran
11 2016). Therefore, focusing on responding to extremes, positive and negative reviews,
12 should yield a higher return. We propose:

13 H3d: The effect of a strategic customer orientation strategy (SCO) on firm's competitive
14 performance is stronger than the effect of a full response strategy (FRS).

15

16 3. Methodology

17 The context of this study is the lodging industry, in which travelers make decisions based
18 on their own past experience with the hotel or the brand; and/or others' experiences
19 shared over the Internet. Therefore, positive online hotel reviews can enhance customers'
20 trust in a hotel (Sparks and Browning 2011) and, as a consequence, increase the hotel's
21 financial performance (Öğüt and Onur Taş 2012). Moreover, as customers become more
22 discerning, they use online reviews to better specify their service requirements and
23 uncover the best value propositions in the market. As a result, it is common for people to
24 read comments about other's experiences to reduce uncertainty before they make a
25 purchase (Zheng et al. 2011; Archak et al. 2011).

26 We developed a dataset uniquely suited to test our hypothesis by joining financial data
27 with online reviews and responses for 39 international hotels in Taipei, Taiwan. For the
28 July 2012 to January 2017 timeframe our dataset includes the hotels' monthly average
29 room rate, monthly average occupancy percentage, and the total number of employees of

the month. The choice of the Taipei market was dictated by the fact that it is one of the few markets where the government collects and publicizes monthly hotel performance data. We complemented performance data with review data from TripAdvisor from June 20, 2004, the date when the first review appeared in one of the 39 hotels, to January 31, 2017. The total sample comprises 27,635 unique individual reviews.

3.1. Measures

Cumulative review scores (Cum_AvgR) is the running average, for each review, of all chronological prior rating for the hotel. This represents the aggregated review score of the hotel on TripAdvisor page. We then aggregate the cumulative review scores by averaging by month to match with the monthly performance data. The total number of review is the review count of the month (TotR). Managerial response capabilities are not a native feature of the TripAdvisor platform. The first managerial response for our sample of hotels appeared on June 28, 2009. Thus, cumulative response percentage (Cum_RespP) is computed by dividing the monthly running total of response number and the monthly running total of the review posted since July 2009¹.

We measure competitive performance through Revenue per Available Room (RevPAR) Index. RevPAR is a standard measure of financial performance in the hotel industry, allowing comparison across hotels with different number of rooms and characteristics. It is computed as the product of the occupancy percentage and the average daily room rate. RevPAR Index compares an individual property's RevPAR to its competitive set, thereby creating a standardized RevPAR measure. We divide the 39 hotels into 5 equally distributed groups based on average daily room rate (4 groups of 8 hotels and 1 group of 7 hotels). The hotels within each group are the competitors to each other. RevPAR Index is computed as the hotel's RevPAR divided by the competitors' average RevPAR times 100. Therefore, a RevPAR Index that is greater than 100 indicates that the hotel outperforms its competitive set within the comparable room rate group while numbers below 100 indicate relative underperformance. Using RevPAR Index as a competitive

¹ There are only 2 managerial responses between June 28 to June 30, 2009. Using only 2 responses to computing the cumulative response percentage will be misleading so they were ignored in the computation.

performance measure allows use to control for all exogenous influences on hotel performance (e.g., economic performance of the overall market, travel market cycle in each segment, seasonality). However, there is a time lag from the day when customers start searching for the hotel information and read the reviews to the actual staying date (when the hotel receives financial benefits). This lead time can be divided into two phases (1) from search to booking and (2) from booking to hotel stay. Based on the statistics reported by HeBS digital, on average a traveler takes 24 days from search to booking (Starkov 2014). We obtained transactional data from July 1, 2012 to August 13, 2015 from one of the 39 hotels under study. The data contains 182,322 reservation records, including reservation dates and arrival dates. On average, customers made a reservation 20.53 days before their arrival. Therefore, we assume that the time lag between a customer reading the hotel reviews and the arrival days is 44.53 days. To confirm the casual relationship, we lag RevPAR Index by 2 months.

We merge the monthly hotel competitive performance data with the monthly aggregated cumulative review score and cumulative percentage of managerial response. This results in a panel data of 2,076 hotel-month paired observations. Out of the 39 hotels, 35 hotels have 55 monthly performance and aggregated review data. The other 4 hotels were established after July 2012; thus, they have less than 55 monthly observations (25, 38, 42 and 46 months to be exact). The descriptive Statistics of the variables are presented in Table 1.

21

Variables	Min.	Median	Mean	Max.	S.D.
RevPAR Index	8.69	53.05	61.42	243.80	33.99
Cumulative Average Review Score (Cum_AvgR)	2.92	4.03	3.99	5	0.37
Cumulative Response Percentage (Cum_RespP)	0	0.16	0.36	1	0.38
Total Number of Reviews (TotR)	0	6	9.92	143	13.31

22 *Table 1. Descriptive Statistics of the Variables*

23

24 We measure response strategy on a monthly basis to capture strategy changes by the
 25 firms. We categorize the different strategies based on the pattern of responses exhibited
 26 on the online review platforms. A firm that responds to no online reviews falls into the no

response strategy (NSR). A firm that selectively responds only positive reviews with a rating of 4 and 5, and/or negative reviews with a rating of 1 and 2, falls into the strategic customer orientation strategy (CSO). A firm that responds to all reviews is assigned to the full response strategy (FRS). The remaining firms, which engage in response activity that does not follow any of the above systematic patterns, represent the no strategy (NS) group.

3.2. Controls

We include average review score (Avg_Review), guest to staff ratio (GuestToStaff), average response window (Avg_Window), TripAdvisor star rating (Tripadvisor), and affiliation (Affiliation) as control variables. Avg_Review is the monthly average of the review score received during each month. It provides a measure of product quality and it is an important control variable to capture the effect of hotel quality on its competitive performance. GuestToStaff is the number of room occupied during the month divided by the total number of staff reporting to work during the month. It is a further measure of product quality. While Avg_Review captures hotel's service quality as perceived by travelers, GuestToStaff is an internal measure of quality, a proxy for the service level offered by the hotel. Avg_Window is the number of days between the review date and the managerial response date. It is a control variable designed to measure the speed with which hotels respond in order to isolate the effect of managerial response beyond the quickness of such action. Finally, TripAdvisor star rating and hotel affiliation (independent, local chain and international chain) are included as controls to capture the hotel's service levels.

4. Data Analysis and Results

4.1. Analytical Procedure

Due to the panel nature of the data (a panel of hotels by months), we perform Breusch-Godfrey/Wooldridge test for serial correlation in fixed effect panel model (Equation 1)

1 and the result small p-value (chi square = 257.11, df = 5, p-value < 0.000). Therefore, we
2 choose to fit a linear mixed-effects model allowing for nested random effects (Equation 2)
3 to test hypotheses H1a, H1b, H2 and H3a.

4

5 $RevPARIndex_{ij} = \alpha_i + \beta_1 \times (Cum_AvgR_{ij})$ (Equation 1: n-entity Fixed Effects Model)

6 $+ \beta_2 \times (TotR_{ij})$

7 $+ \beta_3 \times (Cum_RespP_{ij})$

8 $+ \beta_4 \times (Avg_Review_{ij})$

9 $+ \beta_5 \times (GuestToStaff_{ij})$

10 $+ \beta_6 \times (Avg_Window_{ij})$

11 $+ \beta_7 \times (Tripadvisor_{ij})$

12 $+ \beta_8 \times (Affiliation_{ij})$

13 $+ \beta_9 \times (Cum_AvgR_{ij}) \times (Cum_RespP_{ij}) + \varepsilon_{ij}$

14 $\alpha_i = \beta_1 + \beta_{10} \times (Hotel_i)$ where $\alpha_1, \dots, \alpha_i$ are hotel-specific intercepts to be estimated

15

16

$$\begin{aligned}
& \text{RevPARIndex}_{ij} = \beta_0 + \beta_1 \times (\text{Cum_AvgR}_{ij}) \quad (\text{Equation 2: Mixed Effects Model}) \\
& \quad + \beta_2 \times (\text{TotR}_{ij}) \\
& \quad + \beta_3 \times (\text{Cum_RespP}_{ij}) \\
& \quad + \beta_4 \times (\text{Avg_Review}_{ij}) \\
& \quad + \beta_5 \times (\text{GuestToStaff}_{ij}) \\
& \quad + \beta_6 \times (\text{Avg_Window}_{ij}) \\
& \quad + \beta_7 \times (\text{Tripadvisor}_{ij}) \\
& \quad + \beta_8 \times (\text{Affiliation}_{ij}) \\
& \quad + \beta_9 \times (\text{Cum_AvgR}_{ij}) \times (\text{Cum_RespP}_{ij}) + \varepsilon_{ij} \\
& \quad + \text{random} \sim I|\text{Hotel} + \varepsilon_{ij}
\end{aligned}$$

11

12 RevPARIndex_{ij} = 2 month lag of RevPAR Index of Hotel i ($i = 1, \dots, 39$) during the j -th
13 month $j = 1, \dots, n_i$

14 n_i denotes the number of months for the i -th hotel

15

16 To test hypotheses 3b-3d, we created a dummy variable called *Strategy_d1*, where -1
17 indicates the hotels with no strategy and 1 indicates the others (FRS, SCO and NRS);
18 another dummy variable called *Strategy_d2*, where -1 indicates the hotels with a no
19 response strategy and 1 indicates the ones with a specific patterns of response (FRS and
20 SCO); and finally the last dummy variable called *Strategy_d3*, where -1 indicates the
21 hotels with a strategic customer orientation strategy and 1 indicates the ones with a
22 reassurance strategy. We then conduct a series of analysis of covariance (ANCOVA)
23 (Equation 3, 4 and 5) to test hypotheses 3b-3d.

24

25

$$\begin{aligned}
& \text{RevPARIndex}_{ij} = \mu + \text{Strategy_d1}_i & (\text{Equation 3: Hypothesis 3b}) \\
& + \beta_1 \times (\text{Avg_Review}_{ij}) \\
& + \beta_2 \times (\text{Cum_AvgR}_{ij}) \\
& + \beta_3 \times (\text{Avg_Window}_{ij}) \\
& + \beta_4 \times (\text{TotR}_{ij}) \\
& + \beta_5 \times (\text{GuestToStaff}_{ij}) \\
& + \beta_6 \times (\text{Tripadvisor}_{ij}) \\
& + \beta_7 \times (\text{Affiliation}_{ij}) \\
& + \varepsilon_{ij}
\end{aligned}$$

where μ is the grand mean of RevPAR Index, Avg_Review_{ij} is the average review score for observation j of strategy level i ($i = 1, 2$; $j = 1, 2, \dots, n_i$ and n is the number of observations in i -th strategy). The other covariates are represented in the same manner.

$$\begin{aligned}
& \text{RevPARIndex}_{ij} = \mu + \text{Strategy_d2}_i & (\text{Equation 4: Hypothesis 3c}) \\
& + \beta_1 \times (\text{Avg_Review}_{ij}) \\
& + \beta_2 \times (\text{Cum_AvgR}_{ij}) \\
& + \beta_3 \times (\text{Avg_Window}_{ij}) \\
& + \beta_4 \times (\text{TotR}_{ij}) \\
& + \beta_5 \times (\text{GuestToStaff}_{ij}) \\
& + \beta_6 \times (\text{Tripadvisor}_{ij}) \\
& + \beta_7 \times (\text{Affiliation}_{ij}) \\
& + \varepsilon_{ij}
\end{aligned}$$

1

2 $RevPARIndex_{ij} = \mu + Strategy_d3_i$ (Equation 5: Hypothesis 3d)3 $+ \beta_1 \times (Avg_Review_{ij})$ 4 $+ \beta_2 \times (Cum_AvgR_{ij})$ 5 $+ \beta_3 \times (Avg_Window_{ij})$ 6 $+ \beta_4 \times (TotR_{ij})$ 7 $+ \beta_5 \times (GuestToStaff_{ij})$ 8 $+ \beta_6 \times (Tripadvisor_{ij})$ 9 $+ \beta_7 \times (Affiliation_{ij})$ 10 $+ \varepsilon_{ij}$

11

12 **4.2. Findings**

13 After controlling for hotel specific effects, product quality and managerial response
14 timing, we find that cumulative average review score (Cum_AvgR) and total number of
15 review of the month (TotR) have a significant impact on RevPAR Index. Therefore,
16 hypothesis 1a and 1b are supported. Hypothesis 2 about cumulative response percentage
17 is also supported with a significant positive impact on RevPAR Index with 2-month lag.
18 Finally, the coefficient of the interaction of cumulative response percentage and
19 cumulative average review score is negative and significant (H3a). This result indicates
20 that, as the Cum_AvgR decreases, the positive relationship between Cum_RespP and
21 RevPAR Index strengthens. In other words, the extent to which a hotel responds to online
22 reviews has a stronger positive effect on competitive performance when reviews are
23 negative rather than positive. The results of the fixed effects models are summarized in
24 Table 2. Table 3 reports the correlation matrix of the dependent and control variables.

25

26

Predictor	Coef. β	SE(β)	DF	t-value	p-value
Intercept	-209	80	808	-2.6	0.0089
Cumulative Average Review Score (Cum_AvgR)	30	12	808	2.5	0.011
Total Number of Review (TotR)	0.089	0.043	808	2.1	0.038
Cumulative Response Percentage (Cum_RespP)	129	51	808	2.5	0.011
Monthly Average Review Score (Avg_Review)	-2.4	1.6	808	-1.5	0.13
Guest to Staff Ratio (GTS)	0.039	0.11	808	0.37	0.71
Average Response Window (Avg_Window)	0.024	0.023	808	1	0.3
Tripadvisor	37	18	23	2.1	0.048
Affiliation (International Chain)	37	13	23	2.7	0.013
Affiliation (Local Chain)	3.5	11	23	0.31	0.76
Cum_RespP \times Cum_AvgR	-32	12	808	-2.6	0.01

Table 2. Summary Result of the Fixed Effects

	Intercept	1	2	3	4	5	6	7	8	9
1.Cum_AvgR	-0.368									
2.TotR	0.002	-0.240								
3.Cum_RespP	-0.385	0.745	0.090							
4.Avg_Review	0.023	-0.167	-0.048	-0.032						
5.GTS	-0.120	0.045	0.304	0.052	-0.013					
6.Avg_Window	-0.001	-0.030	0.003	-0.025	-0.086	-0.006				
7.Tripadvisor	-0.809	-0.237	0.143	-0.071	-0.003	0.064	0.022			
8.Affiliation_IC	0.022	0.019	0.026	0.041	0.002	0.035	-0.013	-0.077		
9.Affiliation_LC	-0.183	0.043	-0.003	0.044	-0.008	-0.028	-0.020	0.121	0.266	
10.Cum_RespP \times Cum_AvgR	0.388	-0.758	-0.095	-0.998	0.029	-0.049	0.033	0.076	-0.045	-0.046

Table 3. Correlation Matrix

The results of the three ANCOVA to test the difference among the quality of responses (Table 4, 5 and 6), lend support to our claim that having a strategy is better than having no strategy; having a response strategy is better than having a no response strategy, and finally, having a strategic customer orientation strategy is better than engaging in a full response strategy. Thus, we claim support for H3b, H3c and H3d. Figure 1 shows the number of data points (i.e., hotel-months) associated with each strategy, the average RevPAR Index and the 95% confidence interval of the average RevPAR Index (blue lines).

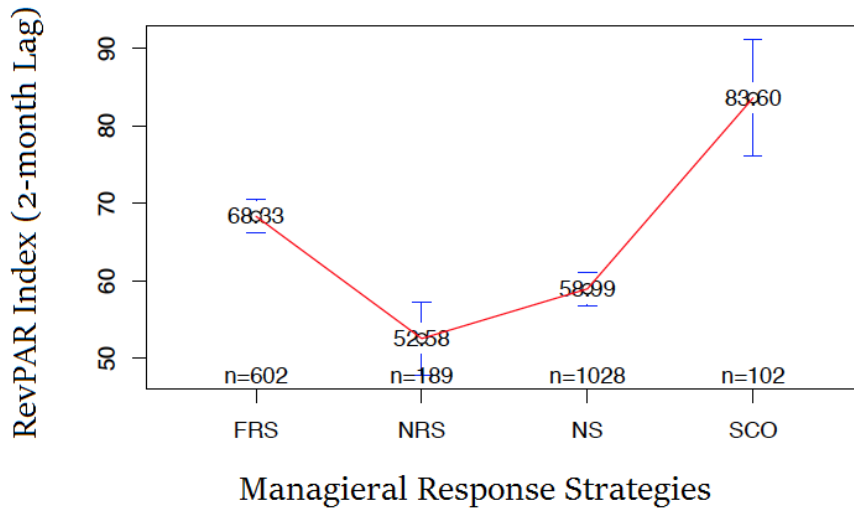


Figure 1. Average RevPAR Index by Strategies

Predictor	DF	Sum Sq	Mean Sq	F value	p-value
Strategy_d1	1	8319	8319	13.4586	< 0.001
Monthly Average Review Score (Avg_Review)	1	63756	63756	103.1462	< 0.000
Cumulative Average Review Score (Cum_AvgR)	1	143106	143106	231.5191	< 0.000
Average Response Window (Avg_Window)	1	4746	4746	7.6778	0.006
Total Number of Review (TotR)	1	515	515	0.8331	0.362
Guest to Staff Ratio (GTS)	1	22991	22991	37.1949	< 0.000
Tripadvisor	1	2542	2542	4.1119	0.043
Affiliation	2	135922	67961	109.9480	< 0.000
Residuals	882	514274	618		

Table 4. Analysis of Variance Table for Equation 3

Predictor	DF	Sum Sq	Mean Sq	F value	p-value
Strategy_d2	1	48096	48096	106.75	< 0.000
Monthly Average Review Score (Avg_Review)	1	97710	97710	216.88	< 0.000
Cumulative Average Review Score (Cum_AvgR)	1	160728	160728	356.75	< 0.000
Total Number of Review (TotR)	1	4845	4845	10.75	0.001
Guest to Staff Ratio (GTS)	1	3755	3755	8.33	0.004
Tripadvisor	1	365	365	0.81	0.369
Affiliation	2	158874	79437	176.32	< 0.000
Residuals	884	398271	451		

Table 5. Analysis of Variance Table for Equation 4

Predictor	DF	Sum Sq	Mean Sq	F value	p-value
Strategy_d3	1	12848	12848	25.64	< 0.000
Monthly Average Review Score (Avg_Review)	1	38794	38794	77.12	< 0.000
Cumulative Average Review Score (Cum_AvgR)	1	77376	77376	154.41	< 0.000
Total Number of Review (TotR)	1	770	770	1.54	0.22
Guest to Staff Ratio (GTS)	1	9305	9305	18.57	< 0.000
Average Response Window (Avg_Window)	1	5461	5461	10.90	0.001
Tripadvisor	1	10	10	0.02	0.89
Affiliation	2	91831	45916	91.63	< 0.000
Residuals	574	287630	501		

Table 6. Analysis of Variance Table for Equation 5

5. Discussion

The introduction and use of online review systems engenders new phenomena and changes the customers' information searching activities in the hospitality industry. Hospitality operators utilize the systems to establish a communication channel with their guests, current and prospective, in order to broadcast their customer-oriented strategies.

A hotel needs to invest more resources in order to monitor the online reviews more frequently, respond to the reviews in a timely manner and provide meaningful communication instead of a standardized messaging. Thus, we focus on the question of how profit-maximizing operators should respond to online customer comments. We contend that firms must develop a response capability that enables them to leverage the nature of online review systems as a broadcast communication channel. In other words, those organizations that are able to implement optimal managerial response strategies (i.e., to effectively use the online review system) will, on average, experience superior competitive performance.

Our results confirm and extend prior literature on the effect of online reviews. We find support for the hypotheses that cumulative online review scores (H1a) and total number of reviews (H1b) are positively related to competitive firm performance. These results are not surprising and are in line with extant theory suggesting that higher review ratings act as a product quality signal for customers and the number of reviews reinforces the trust those customers have in the implicit recommendations of the online review systems

1 (Duan et al. 2008). Our work extends prior literature by using a direct measure of
2 competitive performance, rather than sales or intention to purchase. However, we treat
3 H1a and H1b as confirmatory and our focus is on controlling for these known effects
4 when focusing the analysis on managerial responses.

5 There is still a paucity of research that rigorously and empirically evaluates response
6 management strategies in online review systems (Abramova et al. 2015; Liu et al. 2015).
7 This is surprising since online review systems are widely used by customers and have the
8 potential to strongly impact firm performance. Thus, the consequences of the quantity
9 and quality of their use by organizations should be a foremost concern for tourism
10 management scholars.

11 With respect to the quantity of system use in terms of managerial response (H2), we
12 report a strong positive effect of managerial response. In other words, there is a direct
13 correlation between the use of the online review systems to respond to customer
14 comments and the competitive performance of the firm. It is important to note that this
15 effect is evident even after we control for measures of hotel service quality, measured as
16 star ratings, guest-to-staff ratios, TripAdvisor ratings and chain affiliation. Thus, this
17 result is not simply a proxy of service quality, but rather an incremental effect of
18 responding to online reviews. The positive relationship between the quantity of
19 managerial responses and competitive performance complements and extends finding
20 from previous research. Specifically, unlike previous empirical work on quantity of
21 usage (Devaraj and Kholi 2003), our study focuses on an outward facing system used by
22 customers, rather than an internal system. We demonstrate the importance of system use
23 when the business process impacted is customer facing. We therefore lend support to the
24 notion that the system usage by the management impacts competitive performance not
25 only through improved efficiency in communication process, but also through the
26 signaling strategies to broadcast the hotels' service commitment.

27 Our contribution extends beyond previous literature as we focus on quality of systems
28 use, a construct that has received surprisingly little attention in the literature (Burton-
29 Jones and Grange 2012). We corroborate the notion that 'not all system use is created
30 equal' by showing that managerial responses to online reviews have disproportionate

1 effects depending on the rating of the review they address. In other words, across the
2 continuum of review ratings, investing resources in responding to reviews produces a
3 stronger impact on competitive performance as the rating of reviews tends toward the
4 negative end of the continuum.

5 The corollary to the above finding is the seemingly obvious realization that under
6 resource constraints a firm should ensure quality as well as quantity of the online review
7 system usage. Online review systems are an example of sociotechnical artefacts that the
8 firm is compelled to use by market forces. That is, due to the changing customer
9 information searching behavior, the hotel must devise an online review response strategy
10 to stay competitive in the market. Interestingly, these activities are to be performed using
11 external systems that the firm did not build or purchase. In other words, hotel managers
12 are forced into participation in these channels using systems they did not commission or
13 approve (e.g., TripAdvisor). The functionalities of these applications are limited (e.g.,
14 inability to delete reviews even when they are deemed inaccurate or false). To be sure,
15 some operators choose not to develop such competencies and to ignore the systems.
16 However, as our results suggest, this is itself a strategy, and one that leads to negative
17 results – on average. From an academic standpoint, online reviews systems are an
18 intriguing early example of customer service systems beyond the control of the
19 organizations that the firm must adapt to in order to stay competitive. This is an area ripe
20 for future research. For example, organizations building new information systems
21 typically can act on both the system variables (e.g., IT functionalities) as well as
22 organizational variables (e.g., employees' skills, reward systems). With this new class of
23 external systems, the first set is not available for information systems designers. For
24 example, when it comes to responding to TripAdvisor reviews the system does not allow
25 the ability to offer more than one response to each review. Thus, a hotel that wish to
26 provide a response from the GM and the head housekeeper could not do so. Moreover,
27 there is no way for the staff to numerically rate the guest review, but only text is enabled
28 as a response vehicle. How should hotel approach the development of digital
29 competences for systems they not control or willingly subscribe to? A firm that chooses
30 to engage with the community of users on an online review platform (i.e., does not adopt
31 the no response strategy) must adapt and use the systems to its advantage. We argue that

1 a hotel must design a sociotechnical system usage strategy – a strategy that marshals an
2 understanding of the optimal approach to deploying the sociotechnical artefact (e.g., the
3 online review system) given the firm’s use objectives (e.g., maximization of revenue per
4 available room). We are not aware of any previous research that investigates this question
5 directly.

6 Our findings show that not having a response strategy (i.e., responding haphazardly to
7 customers’ comments) is ineffectual even when the hotel invested some resources in
8 responding. This result may be a function of our residual approach to classification in the
9 no strategy category, which may have failed to identify a deliberate strategy that does not
10 fit in any of the full response, no response and strategic customer orientation categories.
11 Another possible explanation, warranting further research, is that the management sends
12 out a confusing signal without a clearly defined pattern of managerial response. As a
13 result, the customers could not form an evaluative conclusion of the hotel’s service and
14 product quality, and the resources invested in monitoring and responding to online
15 reviews become a waste.

16 Similarly, having a strategy with some level of managerial response yields better
17 performance than having a no response strategy – assuming the hotels are aware of the
18 response function and choose not to respond to any of the customers’ comments. It
19 follows that the firm has no choice but to partake in the online review community. As a
20 consequence, it is imperative that the organization uses the systems effectively within the
21 constraints of the functionalities the system exposes and within the scope of accepted
22 usage practices established by the review system owner and the community of users. This
23 is a very different environment as compared to traditional organizational information
24 systems deployment comprising internal management of proprietary or licensed IT that is
25 fully within the control of the firm. We believe that this is an exciting area for future
26 research. Particularly in light of the increasing emergence of such external systems in
27 areas spanning from customer interactions (e.g., social media) to platform participation
28 (e.g., app ecosystems) and cooperation with supply chain partners. Our work on
29 managerial response strategies in online review systems informs the larger theoretical
30 questions of how the firms improve their system use in the new context.

1 Our results for quality of use show that any patterned response strategy is better than not
2 responding at all. The significant difference between no strategy and the two deliberate
3 approaches to managerial response we identify (i.e., full response and strategic customer
4 orientation) confirms the importance of quality of system usage. Finally, we evaluated the
5 comparative performance of firms adopting the two different approaches to managerial
6 response. In spite of a higher requirement of resource investment when using a full
7 response strategy, the firm's RevPAR Index is significantly lower as compared to hotels
8 with a strategic customer orientation strategy. To further understand the effect of positive
9 and negative online reviews we performed some follow-on analysis. We categorize the
10 hotels that adopt a strategic customer orientation approach into the following two types of
11 strategies²:

- 12 • Positive reinforcement strategy (PRS): the hotel responds only to positive comments
13 in an effort to highlight the positive aspects of its product or service for perspective
14 guests doing online research
- 15 • Reassurance strategy (RS): the hotel responds only to negative comments in order to
16 signal to future online review readers its concern for customers' wellbeing and to
17 clarify any misunderstandings that lead to a negative customer comment.

18
19 We created a dummy variable called *Strategy_d4*, where -1 indicates the hotels with a
20 positive reinforcement strategy and 1 indicates the hotels with a reassurance strategy and
21 conduct an ANCOVA (Equation 6) to evaluate the significant differences between the
22 two strategies.

23

² There are only 5 hotel-month observations with managerial response to both positive and negatives reviews (i.e., responding to all of the extreme reviews). Therefore, we exclude them in the extra analysis.

$$\begin{aligned}
& \text{RevPARIndex}_{ij} = \mu + \text{Strategy_d4}_i \\
& + \beta_1 \times (\text{Avg_Review}_{ij}) \\
& + \beta_2 \times (\text{Cum_AvgR}_{ij}) \\
& + \beta_3 \times (\text{Avg_Window}_{ij}) \\
& + \beta_4 \times (\text{TotR}_{ij}) \\
& + \beta_5 \times (\text{GuestToStaff}_{ij}) \\
& + \beta_6 \times (\text{Tripadvisor}_{ij}) \\
& + \beta_7 \times (\text{Affiliation}_{ij}) \\
& + \varepsilon_{ij}
\end{aligned}
\tag{Equation 6}$$

The result of ANCOVA in Table 7 show that the reassurance strategy emerges as distinctly superior to the positive reinforcement strategy in online review systems. Note that, because of the J-shaped distribution that characterizes online reviews, the number of negative reviews for a typical product or firm is low relative to the total. Therefore, reassurance is not only the approach with the greatest positive impact, but it is also the most efficient from a resource allocation standpoint.

Predictor	DF	Sum Sq	Mean Sq	F value	p-value
Strategy_d4	1	5308	5308.1	5.23	0.02
Monthly Average Review Score (Avg_Review)	1	4299	4298.7	4.24	0.04
Cumulative Average Review Score (Cum_AvgR)	1	22144	22144	21.82	< 0.001
Total Number of Review (TotR)	1	3071	3071.3	3.03	0.09
Guest to Staff Ratio (GTS)	1	2982	2982.4	2.94	0.09
Average Response Window (Avg_Window)	1	0	0	0.00	0.99
Tripadvisor	1	607	606.8	0.60	0.44
Affiliation	2	17109	8554.5	8.43	< 0.001
Residuals	77	78156	1015.0		

Table 7. Analysis of Variance Table

We believe our work can be extended along two dimensions: analytical and theoretical. From an analysis standpoint, we operationalize quality of system usage as response strategy and we measure it by way of the pattern of managerial responses. This is just one dimension of system usage quality in the context of online review systems. While some hospitality literature investigates the text in the managerial responses in an experimental setting (Lee and Song 2010, Treviño and Castaño 2013), it is likely an important factor affecting firm competitive performance as well, and it is certainly a driver of resource allocation. In other words, while it is true that negative reviews are generally few, they are longer and more articulated (Piccoli and Ott 2014). In practice, firms utilize different service recovery responses. Some firms apologize for the issues in the response publicly but prefer to follow up the service recovery with the customers via a private channel (e.g., phone call, or private message in the review system). Others not only apologize for the issues but also broadcast to all users the corrective actions they have taken. Moreover, some managerial response strategies carefully address the issues raised in the online review, while others provide standard responses drawn from a fixed set of templates. One possible approach to the investigation of the response content is to use text-mining techniques (e.g., topic modelling) to compute a measure of breadth and congruence between the customer review and the managerial response (Piccoli 2016). Such measure would improve the precision of our quality of use measure by augmenting the pattern of response with a measure of the information quality of the individual responses (Kettinger et al. 2013). Another approach is to use algorithms to group responses based on their content (e.g., a trained classifier) instead of rating of the review they reply to.

6. Limitations and Conclusions

As with any study using an archival research methodology, we acknowledge some limitations. While we observe the correlation between quantity and quality of online review system usage and hotel performance, we cannot establish a conclusive causal relationship. We seek to limit the impact of this limitation by controlling for product quality and tease out the effect of managerial response. In addition, due to the exploratory nature of the study, we categorize the quality of system usage (in terms of managerial

response) into four different strategies based on the empirical data and previous literature. While our categories are sensible with respect to practice, there is a need for a theoretical framework for guiding future research. Despite the above limitations, we believe our work uncovers an interesting pattern of results that points to the importance of research on quality of online review system use at the property level. Moreover, as the first empirical work focused on the competitive effect of managerial response strategies to online reviews, we hope that our effort spurs future research in this important area. As customer service interactions are increasingly mediated by digital technology, the ability to foster high quality system usage by employees will become a critical competitive lever for hospitality operators.

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