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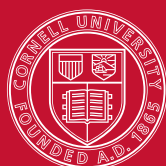


Unscrambling the Puzzling Matter of Online Consumer Ratings: An Exploratory Analysis

Cornell Hospitality Report

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by Pradeep Racherla, Ph.D., Daniel Connolly, Ph.D. and Nastasa Christodoulidou, Ph.D.



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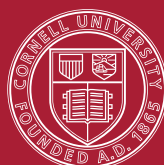
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EXECUTIVE SUMMARY

This study explores the patterns of online reviews of vacation homes from a community-based travel advisory website with a goal of understanding the biases inherent in online word of mouth (WOM) related to tourism and hospitality services. An analysis of nearly 3,200 reviews from “Reviewsite.com,” (a pseudonym) which posts reviews of vacation rental properties across the USA, finds an overwhelming preponderance of favorable reviews. More to the point, relatively few “moderate” reviews are posted, and the second-highest category is extremely negative comments. Using semantic processing techniques on the aggregate review text, the study identifies the nuanced opinions and concerns of the travelers who write reviews. Negative reviews tend to be lengthy and argumentative, often detailing disappointment over expectations not met. Positive reviews, on the other hand, tend to be relatively brief and confirm the overall rating. Consumers who wrote “high” reviews placed greater importance on value for money, cleanliness, and comfort than did those who wrote negative reviews. Those who wrote “low” reviews placed their emphasis on the service provided by the property staff and management. Negative reviews were more likely to involve a higher price accommodation. This analysis indicates that the overall numerical ratings typically used in review systems may not be the ideal indicator of perceived service quality. The results suggest that review sites should develop better methods to aggregate, synthesize, and publish the review contents, particularly the numerical ratings. This and other review sites show the average of all the point-scale ratings, but such simple means do not take into account the biases that are inherent in the rating systems. Instead, the sites should provide more information and heuristics to help the consumers navigate through the clutter and get the information they desire.

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Given that consumers are increasingly relying on search engines to acquire information about hotels, restaurants, and travel purveyors (among many other services), consumer-generated online reviews will inevitably change the structure and accessibility of information, along with consumers' perceptions of various services. The popularity of online reviews has led to a proliferation of online review sites, including popular sites such as Hotels.com, Tripadvisor.com, and Yelp.com. A recent study by Forrester Inc. found that more than 80 percent of web shoppers read and consider other consumers' reviews.¹ Similarly, Compete Inc. found that nearly 50 percent of purchasers visited a message board, forum, or online community for information connected with their online travel purchasing, and one in three of these buyers said that consumer reviews helped with their purchase decision.² Almost half of these consumers said that consumers' opinions actually caused them to change their mind about what they purchased. Moreover, among those buyers, 25 percent said they also posted a review on a consumer review site after making their purchase.

¹ Forrester, "Forty Facts about U.S. Online Shoppers," Forrester Inc., 2006.

² Compete, "Embracing Consumer Buzz Creates Measurement Challenges for Marketers," Compete Inc., 2006.

However, the existing understanding of online tourism-related reviews is relatively weak, even though we know that word of mouth (WOM) is more important and influential within a services context than in product marketing scenarios. Recently, some studies have explored tourism- and hospitality-related online WOM.³ Yet, research has so far overlooked certain interesting aspects of online reviews, as follows:

Online reviews typically use “overall star ratings” as primary indicators of perceived service quality—ratings that are not related in any way to the formal star designations awarded by *Forbes* or Michelin. Consumers’ mean star ratings are typically aggregated from the ratings given by individual consumers in each review. What we don’t know is how consumers determine the stars they assign to a service when they post a review on a website. That is, do star ratings accurately reflect consumers’ sentiments regarding various attributes of service providers? This is a vital issue given the experiential and intangible nature of travel services, and the fact that consumers use the overall rating as an important heuristic while narrowing down choices.

Further, studies have overlooked the relationship between the reviews and various attributes of services and service providers. Since online reviews are a form of WOM, variables such as consumer involvement, pricing, and length of stay may have an impact on the final rating and posting of the review provided by consumers. It is important to uncover these relationships to better understand the dynamics of online reviews.

Few studies have analyzed the qualitative aspect of online reviews. Online reviews are essentially open-ended, text-based, consumer-to-consumer (c2c) communications. The text content may contain nuanced views of the services and service providers (from the review writers’ point of view) that cannot be expressed using crude numerical ratings.⁴ Hence there is a need to analyze the text portion of the reviews and identify the issues that consumers are mostly concerned with when writing and posting online related reviews.

We address the above points in this study. The following questions guided us:

1. Do overall ratings reflect the perceived quality of the service providers (as derived from the consumers’ expressed sentiment in the reviews). What are the underlying patterns of the overall ratings in online reviews?
2. What are the linkages among the various attributes of the service providers and customer reviews?, and
3. What are the issues that consumers mostly talk about in the text portion of online reviews? Do these issues differ from the ratings that the consumers have provided via the standard variables provided by the review sites?

Research Setting and Data Collection

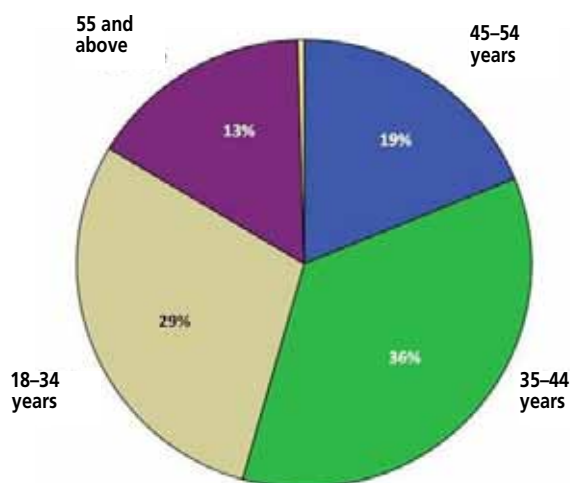
This study is based on reviews collected from “Reviewsite.com,” as we have called the community-driven travel site that we analyzed. The site provides reviews of verified rental properties and organizes the reputation of vacation properties. The property listing within the site is based not on the revenue sharing model that is generally practiced by other review sites but on the reputation, trust, and feedback from customers who have stayed at the vacation rental properties. Reviewsite.com is a free service that operates on service provider fees and advertising revenues. Unlike some travel review sites, the firm’s review solicitation strategy is to send personalized invitations only to those customers whose stay has been verified by the property management. The site’s management believes that this strategy, to a large extent, eliminates fake reviews.

The firm provided us with 3,300 reviews for analysis. After initial data clean up, about 100 reviews with incomplete or unusable information were eliminated and 3,197 reviews were used for the analysis. The reviews contained the following attributes:

- The overall rating assigned to the service provider based on the aggregation of the ratings assigned by individual reviewers;
- Consumers’ ratings on the following six attributes: value, cleanliness, comfort, service, location, and check-in;
- The review text (Semantic processing techniques were applied on the aggregate review text to identify the nuanced opinions and concerns of the travelers who wrote reviews.);

³ K.H. Yoo and U. Gretzel “What Motivates Consumers to Write Online Travel Reviews?,” *Information Technology & Tourism*, Vol. 10 (2008), pp. 283-295; and Z. Xiang, and U. Gretzel, “Role of Social Media in Online Travel Information Search,” *Tourism Management*, 2009.

⁴ A. Ghose and P.G. Ipeirotis, “Estimating the Socio-economic Impact of Product Reviews: Mining Text and Reviewer Characteristics,” *Information Systems Research*, 2008.

EXHIBIT 1**Distribution of age ranges**

- Age range of the reviewer on an 1-4 ordinal scale (25-34, 35-44, 45-54, and 55 and above);
- Average price per day; and
- Word count (used in the quantitative analysis).

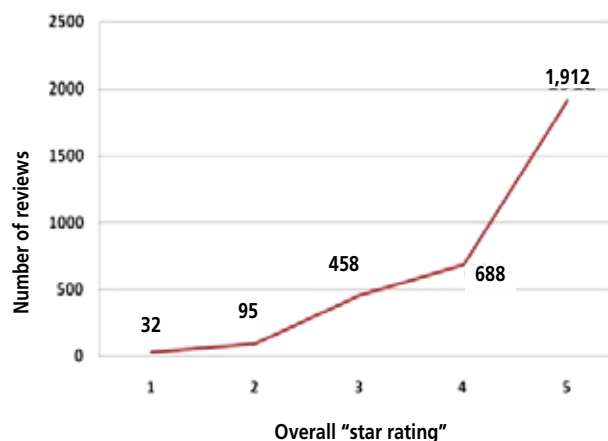
Preliminary Hypotheses and Results

The age groups of the review writers are shown in Exhibit 1. A large percentage of the customers who reviewed the properties fall under 44 years of age. This is consistent with previous studies in this realm which show that generation X and Generation Y are more active in the WOM forums.

Review Rating Distribution

Websites that host online reviews give consumers the option to assign a rating to the service providers, typically on a scale of 1 to 5 or 1 to 7. Many sites aggregate these numerical or star ratings to determine an overall (mean) star rating. We see this overall rating as an important element in online WOM since consumers often use this rating to narrow down their consideration set. Studies that have used the rating as the primary predictor of the service providers' perceived quality or customer satisfaction to determine the impact of online reviews on product sales have arrived at mixed findings.⁵ However, these studies are based on the fundamental assumption that the numerical ratings assigned to service

⁵ For example, see: J. Chevalier and D. Mayzlin, "The Effect of Word of Mouth Online: Online Book Reviews," *Journal of Marketing Research*, Vol. 43 (2006), pp. 345-354; and W. Duan, B. Gu, and A.B. Whinston, "Do Online Reviews Matter?—An Empirical Investigation of Panel Data," *Decision Support Systems*, Vol. 45 (2008), pp. 1007-1016.

EXHIBIT 2**Distribution of overall "star ratings"**

providers are an accurate estimate of the quality perceived by the customer. This practice follows the basic assumption of behavioral theorists that any data set with a large number of consumer responses tends to follow a normal (Gaussian) distribution. Recent studies have questioned this assumption. For instance, Dellarocas and Narayan's study on movie reviews in Yahoo.com found that only the extremely satisfied and extremely dissatisfied customers are likely to publicly express their opinions as compared to customers with moderate opinions.⁶ Similarly, studies using data from TripAdvisor.com and Amazon.com found that the star ratings exhibit a truncated distribution in which the majority of reviews are positive.⁷

To test this assumption, we ran a simple frequency chart, as shown in Exhibit 2. In keeping with other studies, the distribution is heavily skewed towards the positive ratings: 1-point reviews: 32 (1%); 2-point reviews: 95(3%); 3-point reviews: 458 (14%); 4-point reviews: 688 (22%); and 5-point reviews: 1,912 (60%). To test for the robustness of this distribution, we applied the Kolmogorov-Smirnov test of normality. The results confirm the non-normal distribution of the star ratings and the heavy skew towards positive reviews.

Three explanations are possible for such a distribution:

⁶ C. Dellarocas and R. Narayan, "A Statistical Measure of a Population's Propensity to Engage in Post-purchase Online Word-of-mouth," *Statistical Science*, Vol. 21 (2006), pp. 277.

⁷ A. Talwar and R.F. Boi Jurca, Understanding User Behavior in Online Feedback Reporting," in *Electronic Commerce*, San Diego, California (2007). pp 134-142,

Regression analysis of “low” and “high” reviews

	Low Reviews	t-value	High Reviews	t-value
(Constant)	1.618	18.353***	2.400	34.186***
VALUE	0.254	13.726***	0.378	8.767***
CHECKIN	-0.083	-3.701	-0.053	-1.192
LOCATION	0.104	6.132	0.079	2.117
CLEAN	0.144	7.574***	0.112	2.808***
COMFORT	0.267	13.993***	0.129	3.088***
SERVICE	0.098	4.209*	0.107	2.401
R ²	0.331		0.338	
F-Statistic	50.38		247.14	

Notes: Coefficients (t-statistics reported). Significance is as follows: *** significant at 0.001 level; ** significant at .05 level; * significant at 0.10 level. Dependent variable is overall rating.

1. A majority of the properties that are listed on the website have outstanding perceived quality and provide satisfactory services to customers. While this is theoretically possible, it seems unlikely when applied to all the properties listed on the website.⁸
2. The reviews do not constitute a truly representative sample of consumer opinion. Based on other studies, this explanation seems plausible. Consumers with moderate views may see little incentive to report their views in an online forum, and as a consequence, only those consumers who have polarized views are likely to post their comments.
3. The distribution could also be an artifact of the firm's review soliciting strategy. Recent studies support this idea by suggesting that customers engage in socially desirable behavior even in impersonal interactions with the service providers.⁹ In this case, it may be that they will provide a reasonably positive review even if the experience has not been up to the mark.

Star Ratings and Perceived Service Quality

Let's return to the first question we asked at the outset: Are star ratings a true representation of service providers' perceived quality as reflected by the consumers' stated sentiments? This becomes an important question for two

reasons: **(a)** ratings are the primary evidence that consumers consider while shopping online for information, and **(b)** the truncated nature of rating distributions means that the reviews available may not truly represent consumer opinion or the service providers' perceived quality. If only those with extreme views post reviews, then consumers should always look for service providers that have a 5-star rating. On the contrary, if the reviews accurately reflect all consumers' views, then consumers are better off searching for reviews with a 3 rating since these tend to be more balanced and enable better product analysis. Recently, Hu *et al.* used data from Amazon.com show that numerical scores do not reflect books' true perceived quality.¹⁰ As they suggest, "...rather, the score reflects the balance of diverse opinions. In other words, when a book's overall score is around 3, it does not suggest that consumers generally agree that this is an average book. It rather suggests that roughly equal number of consumers think that the book is either an outstanding book or an abysmal book."

To test this assertion, we applied a regression equation with six property attributes (i.e., value for money, check-in, location, cleanliness, comfort, and service) as independent variables and star rating as the dependent variable. This analysis is based on the assumption that for a given property, if star ratings truly represent the perceived quality of the properties (as well as the consumers' sentiment), then the star ratings and ratings of the six other property attributes

⁸ A. Kadet, "Rah-Rah Ratings Online," *SmartMoney*, 2007.

⁹ Y. Grégoire and R.J. Fisher, "Customer Betrayal and Retaliation: When Your Best Customers become Your Worst Enemies," *Journal of the Academy of Marketing Science*, Vol. 36 (2008), pp. 247-261.

¹⁰ N. Hu, J. Zhang, and P.A. Pavlou, "Overcoming the J-shaped Distribution of Product Reviews," *Communications of the ACM*, Vol. 52 (2009), pp. 144-147.

Example of a “high” review

Star Rating ★★★★★					
Text Commentary					
This was our 1st time renting a house vs. a condo. This house was great. If you wanted to spend a little time by yourself you could, so many rooms to go to. The house was so comfortable, like being at home. It was our home for the week. Thank you. Hope to rent it next year if we haven't bought one ourselves.					
Ratings for Specific Attributes					
Value	Check-In	Location	Clean	Comfort	Service
3	2	3	2	4	3

Avg Rating for Property Attributes
3.0

will show a high correlation. For the analysis, we took into consideration the fact most reviews are positive (i.e., 4- and 5-point ratings). Therefore, we divided the reviews into two categories, high reviews (star rating above 3; $n = 2,597$) and low reviews (ratings below or equal to 3; $n = 600$), and ran separate regression analyses on these two groups, as shown in Exhibit 3.

An interesting finding is the weak relationship between the attribute ratings and overall star rating for each property. The R-square of the regression equation with all six variables and the overall star ratings is less than 40 percent. That is, even if the consumers provided higher ratings on individual attributes, their overall rating was usually low, and the reverse was also true. This trend is observed in both the high and low review groups.

The analysis suggests that in high reviews, consumers placed greater importance on value for money, cleanliness, and comfort. The higher the ratings of a consumer on these attributes, the higher is the likelihood that the consumer will provide a higher star rating. Check-in, location, and service did not prominently figure in their overall evaluations of the properties even though these attributes were rated high.

The low reviews show similar results in the sense that the lower a consumer rates value, cleanliness, and comfort, the lower the likelihood of a positive rating. In addition, in the case of low reviews, consumers placed emphasis on the service provided by the property staff and management.

The above result is illustrated in one of the “high” reviews shown in Exhibit 4. The reviewer gave low to

moderate ratings on all the attributes but was still willing to provide a high overall star rating to the property. This example suggests that consumers place significant emphasis on the overall experiential value provided by the properties. This expectation of value is many times intangible and does not necessarily depend on the functioning or rating of the individual features of the property.

Relationship between Ratings and Review Attributes

To understand consumers’ word-of-mouth behavior, it is important to consider various factors, such as perceived expectations of costs and benefits, importance of the purchase (involvement), personal characteristics, and situational influences. We consider two factors that are known to affect the intensity and valence (positive or negative) of word of mouth: price and word count.

Price. Price is an important factor that contributes to pre-purchase expectations. The intensity of expectations (and their fulfillment), partly driven by price, is directly proportional to consumers’ satisfaction levels and WOM propensity. This may be the reason that the tendency to complain is directly related to the cost of the service.¹¹ The more expensive an item, the greater will be the perceived losses and the greater likelihood that dissatisfaction will result in a complaint. Similarly, the likelihood of word-of-mouth being triggered by the level of expectation–disconfirmation increases

¹¹ Bearden, W. O., and Teel, J. E. (1983) Selected determinants of consumer satisfaction and complaint reports, *Journal of Marketing Research* 20, 21-28.

with the cost of the product.¹² Given the greater perceived risk in services, customers would seek more trustworthy service providers with a good reputation of satisfying customer needs.¹³ This in turn increases the expectations and leads to more extreme reactions from the consumers. Hence, one can speculate that the higher the prices, higher will be the average negative or positive ratings for a service.

Word count. The number of words in a review may serve as a proxy for the amount of information in the reviews. However, the evidence on this aspect of WOM of all types is equivocal. For instance, consumers generally engage in positive WOM to avoid feelings of guilt and association with bad news and to reduce cognitive dissonance. On the other hand, a customer who is highly disappointed will provide a persuasive argument to make sure that other customers are dissuaded from renting the same property. Research on conventional word of mouth has offered ample evidence to suggest that dissatisfied customers engage in two to three times as much WOM as satisfied customers.¹⁴ We believe that this logic extends to online reviews, despite the fact that existing studies are equivocal at best.¹⁵ Therefore, it can be assumed that reviews with either extremely positive or extremely negative ratings will have greater word count as opposed to more moderate reviews.

To test these assumptions, we applied ANOVA with price and word count as dependent variables and the review rating as factors. As illustrated in Exhibits 5 and 6, the results show that price and word count show a significant negative correlation with star rating. That is, reviews with lower ratings are typically associated with greater word count and represent properties that charge high rates.

The result on the word count suggests that consumers who are unhappy with a rental property tend to write more to express their dissatisfaction. As shown in this exhibit, lower ratings are associated with higher number of words in the reviews and vice versa. Similarly, property price seems to be strongly associated with negative word of mouth, supporting the principle that higher cost increases the consumers' involvement in the purchase.

¹² Bearden, W. O., and Mason, J. B. (1984) An investigation of influences on consumer complaint reports, *Advances in Consumer Research* 11, 490-495.

¹³ Wetzer, I. M., Zeelenberg, M., and Pieters, R. (2007) "Never eat in that restaurant, I did!": Exploring why people engage in negative word-of-mouth communication, *Psychology and Marketing* 24, 661-680.

¹⁴ Schlossberg, H. (1991) Customer satisfaction: Not a fad but a way of life, *Marketing News* 25; and Westbrook, R. (1987) Product/Consumption-based Affective Responses and Post-purchase Processes, *Journal of Marketing Research* 24, 258-270.

¹⁵ Alex M. Susskind, "I Told You So! Restaurant Customers' of Word-of-Mouth Communication Patterns," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 43, No. 2 (April 2002), pp. 75-85.

EXHIBIT 5

Differences in word count across star ratings

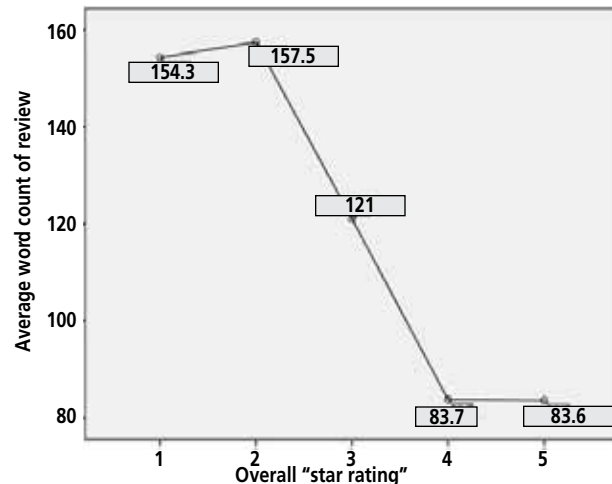
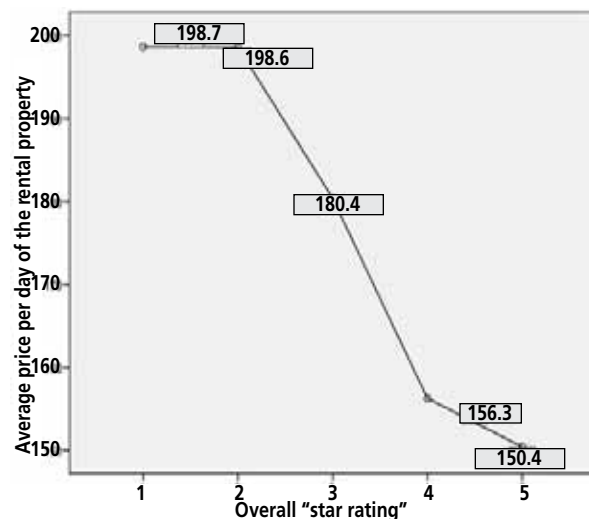


EXHIBIT 6

Differences in average price per day across ratings



Top five prominent issues in low reviews

Prominently Mentioned Features	Freq.	Sample Comments
Bedroom, Beds, Linen, Sheets	383	Also the same bedroom and bathroom did not have any door separating the bedroom from the bathroom!! no privacy!!
		Sleeping arrangements were very awkward. The listing sheet described 2 full beds. We brought our own linens, the beds were queen sized. Had to purchase sheet.
Kitchen, Kitchenware, Dishes, Dishwasher	297	You must not forget to step up when you're walking out of the kitchen into the dining room, otherwise you'll trip over the 3-foot step up.
		No potholders in the kitchen and it didn't seem like there were as many kitchen supplies as before. We just had to make do without.
Beach, Beaches, Beachfront	296	The week was the best vacation we have ever had as a family. The beach house was a class act!!!!
		Disappointment #1: It looks like this house is very close to beach, but to get there you have to go around through public path.
Pool, Poolside	218	The pool was too dirty to use. We checked in on Thursday and the pool was not cleaned until Saturday.
		Also it is inconvenient to have to call to get someone to open the pool. Didn't understand why Jacuzzi was open and not the pool?
Bathroom(s), Bath, Bathtub, Shower	202	The next problem was in another bathroom (main floor)—the wall heater did not work so showering in here was a bit chilly. The next problem was in the "master" bathroom (connected to the bedroom with the King bed). The sliding shower doors need to be totally replaced.
		Bathtub drains clogged in three second floor bathrooms.

Qualitative Analysis of the Review Text

The above analysis emphasizes the importance of the text content in consumer reviews. While numerical ratings allow the reviewers to rate the service provider on various attributes, it is the text that provides them with the opportunity to articulate the nuances of their overall experience and convey useful information about a service provider's transactions and service capabilities. Therefore, semantic analysis of the text content provides us with an opportunity to the third question presented at the outset of this report: what do consumers talk about in their reviews?

To this end, we analyzed 600 each of randomly selected high and low reviews using semantic processing techniques. We used centering resonance analysis (CRA), a mode of network-based text analysis that represents the content of large sets of texts by identifying the most important words that link other words in the network.¹⁶ Our analysis examined syntactic and semantic features. Syntactic features include the percentage of the words that are open class (i.e., nouns, verbs, adjectives). Semantic features represent the specialized vocabulary that reflects the overall opinion expressed by

the reviewers. These can be classified as: **(a)** attributes or features of the property that figure prominently and contribute to the positive or negative ratings (e.g., rooms, bed, dishes, furniture, or service), and **(b)** the positive or negative words that represent the sentiment of the reviewer (e.g., great, amazing, dirty, and wonderful). The results of the qualitative analysis are as follows.

Syntactic features. The overall tone of the low reviews is rather argumentative. The reviewers tend to be forceful in presenting their point of view. They lay out a great amount of reasoning and provide specific examples to drive home their argument. This is reflected in the greater percentage of negative connector words (34%), such as *but*, *however*, *as if*, and *even though*. It is interesting to note that reviewers in this category speak directly to the other consumers, notably through greater use of words such as *you* (46%), and look to influence their decision making.

In the high reviews, by contrast, the overall tone tends to be enunciative, and the reviewers use the text to merely reinforce their numerical ratings, using fewer words on average than the negative reviewers. In these reviews, the consumers focus on their personal experiences and appeal to the audience through emotions rather than logic and reasoning, as evident from greater use of positive adjectives

¹⁶ Corman, S., and Dooley, K. (2006) *Crawdad Text Analysis System 1.2*, Crawdad Technologies LLC, Chandler, AZ.

Top five prominent issues in high reviews

Prominently Mentioned Features	Freq.	Sample Comments
Beach, Beaches, Beachfront	506	Perfect rental property for those who enjoy the activity of the beach and the serenity of the Sound! The house is just down the road from ocean.
		The large porch offered a beautiful view of the beach and comfortable new rocking chairs.
Pool, Poolside	218	The outdoor shower, dipping pool, and screen in porch were an added bonus. Perfect house for a low key weekend.
		House was great for kids. Pool was terrific and the playroom was perfect.
Location	192	We had a wonderful time. My wife loves fishing and the cottage was in a perfect location to go fishing on the pier.
		The home is somewhat dated but the location was great. We have vacationed in the Chatham area for many summers and this time it was great too.
Bedroom, Beds	186	The family suite is huge with a king size and twin bed and still room for a pack-n-play. The kitchen and dining room were huge, clean, and nice!
		The only comments that I would say to the negative is the front bed room by the front door always seemed damp which seem to attract more bugs.
Kitchen, Kitchenware, Dishes, Dishwasher	178	All of the amenities in the house are upscale—loved the kitchen and plasma TVs!
		The kitchen had good basic utensils, dishes and cooking pans.

such as *great*, *fantastic*, and *awesome* (45%) and personal pronouns such as *we* and *I* (54%).

Semantic features. Exhibits 7 and 8 show the main issues or aspects that are prominently discussed in the low reviews. The order of these issues is based on the statistically significant frequency of their occurrence in the 1,200 reviews.

We further investigated the use of various sentiment words. Interestingly, the prominent issues discussed in the positive reviews sometimes do not even figure in the rating scales provided to the reviewers. Overall, the results of the semantic analysis can be summarized as follows:

The property and its features are more commonly connected with extremely positive sentiment words such as *great*, *wonderful*, and *amazing* in the high reviews than in the low reviews. In comparison, the properties and their features in the low reviews are more likely to be characterized with moderately positive words such as *nice* and *okay*.

Negative reviews reflect the extent of expectation–disconfirmation that the consumers face during their stay in the rental property. These reviews have a greater proportion of words expressing disappointment (e.g., not as expected). Further, extremely negative sentiment words (e.g., discomfort, filthy) and adjectives are more likely to be associated with features in low reviews than in high reviews.

Almost 40 percent of the consumers who wrote high reviews express their willingness to return to the property as opposed to only 9 percent of those writing negative reviews. Further, more than 20 percent of the consumers giving high reviews express their strong desire to recommend the property to their friends and family members as opposed to only 5 percent in low reviews.

Review of Findings

Our exploratory study of consumer reviews of U.S. vacation homes on Reviewsite.com was highlighted by overwhelmingly positive reviews.

The overall distribution of the reviews was heavily skewed towards the positive ratings. More critically, this finding suggests that there is a lack of moderate and balanced opinions. We theorize that this is either due to purchasing bias (since customers went through the trouble of purchasing and experiencing the facilities, they tend to be positively biased towards their purchase) or under-reporting bias (customers do not have strong enough incentives to take the trouble of reporting their opinions and the few motivated individuals who provide their reviews become a self-selected sample).

The overall (mean) star rating typically used in traveler review sites is probably not the most accurate indicator of customers' perceptions of service providers' quality. We

found a correlation between the star rating and ratings on other property attributes of less than 40 percent in most cases.

A high word count in the reviews is correlated with a low overall rating. That is, consumers who are extremely dissatisfied tend to expend more time and energy on their critique of the property, its amenities, and services. Price of the property also seems to positively correlate with extreme negative reviews, perhaps because a high price heightens travelers' expectations.

Numerical ratings do not often capture the actual sentiment and the variety of dimensions on which travelers evaluate properties. Because numerical ratings do not capture reviewers' opinions about specific attributes, they can be deceiving and may not reveal the true quality of the property or the actual intention of the reviewer. We found, for instance, that consumers value location (e.g., closeness to the beach) and cleanliness (e.g., swimming pool areas) more than such features as check-in and service. Similarly, in the negative reviews, issues such as lack of bedroom paraphernalia or kitchen items seem to be ranked higher in importance than issues such as location and check-in. Therefore, even when a property scores high on the certain dimensions, the overall rating may remain low because other factors overshadow the favorable aspects.

What It Means for Managers

We see implications for online review sites and, by extension, for proprietors of vacation homes and service operations generally. With regard to the review sites, if consumers consistently detect a favorable bias, the review sites may lose the critical aspects of credibility and trust. Although consumers are generally smart and rational and can work around obvious biases, recent evidence suggests that consumers are gradually defecting from some online sites due to unbalanced reviews.¹⁷ In this regard, site administrators as well as property managers should take steps to attract those consumers who are willing to provide a reasonably balanced analysis of the amenities and services. By this, we mean reviews that present comprehensive and objective analysis of the service provider rather than just raves or rants.

To that end, site operators should take steps to understand customers' review writing behavior and to attract more balanced reviews. One way to do this is to give personalized information to the consumer demonstrating the contribution made by his or her review and the value of the review to stakeholders. For instance, Ling *et al.* found a positive correlation between willingness to write reviews and the consumers' perception that their contributions would be unique and helpful to other customers as well as perused by

the service providers.¹⁸ Simply put, the propensity to write reviews increases when the consumers feel that their review is actually helping others (both the service provider and other consumers).

We suggest that review sites develop better methods to aggregate, synthesize, and publish specific review comments, as well as numerical ratings. First, managers should take into consideration the low correlation between the overall ratings and consumers' assessments of various property attributes (as well as the results from the text analysis). The implication of such a weak correlation is that review sites need to expand on the list of possible variables so that the ratings accurately reflect consumers' needs and expectations regarding service providers.

Further, site managers may have to rethink the current practice of averaging all the ratings for a given property, because such a mean rating fails to take into account the biases that are inherent in the rating systems. As an example, this study finds significant under-reporting bias in this online review site. A customer's decision to not post online reviews may mean the loss of important information that can assist the users of the sites to make more reliable inferences. The majority of today's feedback mechanisms do not publicly disclose the number of silent transactions (i.e., transactions for which no feedback was posted by customers). Such information should become a part of a service provider's online profile on rating sites and other feedback mechanisms. It is important to provide more information and heuristics to help the consumers navigate through the clutter and get the information they want and seek.

It is important to apply modern semantic analysis and sentiment classification techniques to study the content of the reviews and identify various dimensions on which consumers evaluate vacation homes. The details provided in the review text are in many ways a better reflection of customer satisfaction. Service providers can better position themselves using the dimensions uncovered through text analysis and target the needs and preferences of their customers.

The results in this study show that negative reviews are typically associated with a greater word count than positive reviews. It is useful to focus specifically on these negative reviews because they can reveal patterns of deficiencies in the service standards and delivery. These reviews should be treated the same as customer comment cards or letters.¹⁹ Further, customers who write such lengthy negative reviews

¹⁷ Hartevelde, H. H., Johnson, C., Stark, E., and Geldern, K. V. (2009) Using Digital Channels To Calm The Angry Traveler, Forrester Research.

¹⁸ Ling, Kimberly, Gerard. Beenen, Paul. Ludford, Xiaoxing. Wang, Kevin. Chang, Xin. Li, Dan. Cosley, Dan. Frankowski, Loren. Terveen, Al. M. Rashid, and Robert Kraut. "Using Social Psychology to Motivate Contributions to Online Communities." *Journal of Computer-Mediated Communication* 10, no. 4 (2005).

¹⁹ Milan, R. (2007) 10 things you can do in response to traveler reviews, in Hotelmarketing.com.

are most likely to spread negative word-of-mouth about the property. Lengthy reviews are excellent sources of information, and should be used as the bases to understand the complaining behavior of the consumer.

Word count may be used as an additional segmentation variable to identify those consumers who are more involved and willing to provide balanced feedback to both the review site as well as to property management. Various other research methods such as telephone interviews or focus groups should be used to elicit detailed feedback from such consumers. These actions also help in service recovery, post-purchase engagement and relationship building.

Outlook

We foresee three potential areas investigation that can add value to current best practices. We still don't know much about consumers' motivation to write online reviews.²⁰ Recent studies identify various antecedents of review writing but suffer from sampling bias, since they survey a self-selected sample of consumers who already provided reviews. As the results in this study indicate, under-reporting bias (lack of moderate and low reviews) remains prevalent in online review sites. Future research should identify socio-psychological factors that increase consumers' propensity to write online reviews.

Future research should explore the impact of the presence (or lack) of extremely negative reviews within a large corpus of positive reviews. The evidence on the impact of re-

view valence (negative or positive) is equivocal. Proponents of confirmatory bias suggest that consumers look for affirmative evidence supporting a product choice already made. If that is the case, positive reviews are more likely to have a greater effect on consumer actions. On the other hand, the notion of negativity bias suggests that when consumers are neutral, negative reviews tend to become more salient than positive reviews.²¹ In the presence of large numbers of positive reviews, consumers specifically seek negative reviews that they feel will help them identify specific problems with a service. Understanding how consumers reconcile the information provided by both negative and positive reviews has implications for the design and management of review sites.

Finally, a review's word count has important implications for consumers' trust in the reviews. When consumers are willing to read and compare open-ended comments from other consumers, the amount of information in a review can matter. WOM for high involvement products is more persuasive and increases the decision maker's confidence when the message sender provides greater number of reasons for their overall rating. Longer reviews provide more information and are likely to be perceived as more helpful and persuasive than shorter reviews. The ways in which a review is written, framed, and presented is an interesting factor which has rarely been investigated, and has important implications, particularly given our finding that the amount of information in a review (word count) varies significantly with the ratings of the review. ■

²⁰ Wang, Y., and Fesenmaier, D. R. (2003) Assessing Motivation of Contribution in Online Communities: An Empirical Investigation of an Online Travel Community, *Electronic Markets* 13, 33-45; and Yoo, Kyung, H., and Ulrike, Gretzel. "What Motivates Consumers to Write Online Travel Reviews?" *Information Technology & Tourism* 10, No. 4 (2008): 283-95.

²¹ Ba, S., and Pavlou, P. A. (2002) Evidence of the Effect of Trust Building Technology in Electronic Markets: Price Premiums and Buyer Behavior, *MIS Quarterly* 26, 243-268.

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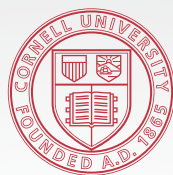
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