

# Rating Determinants Factored in E-Commerce Decision-Making

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The user-generated content (UGC) Web sites are gaining popularity for a wide range of media content, such as news, blogs, forums, and open-source software. Instead of relying on information on company Web sites, users benefit by reading reviews written on UGC Web sites by consumers. Online evaluations are usually informative and reduce the information asymmetry. This study examines the problem where UGC can be expedient for online hotel booking. It investigates the relationship between the ratings obtained from the TripAdvisor.com reviewers and the hotel price levels in the United States, outside the United States, and top 20 hotels and others, respectively. Findings suggest that medium-priced hotels provide a comparable value with their high-priced counterparts. Further, the ratings for U.S. hotels are lower than others across all price levels.

**Keywords:** *user-generated content, trust, reputation*

## Introduction

Information asymmetry problems (Akerlof, 1970) are widely observed in many contexts. In e-commerce, online sellers provide information favorable to their products to attract more potential buyers (Ba, 2001). In finance, entrepreneurs know much better than investors, but on annual financial reports, they do not necessarily reveal what they know (Healy & Palepu, 2001). Corporations have full control of what information to post on their official Web sites, and the information can be generally selected (Garcia-Retamero & Rieskamp, 2008).

The ongoing advances in communication technology are increasingly facilitating a growing number of users to flock to social media and user-generated content (UGC) Web sites to access product information. According to the Arbitron and Edison business report (Nielsen, 2013), 65% of U.S. users take into consideration the information shared through social networks when making purchasing decisions. For instance, when buying a product like a tablet, consumers want to have more information to learn about the product than simply basic features, such as weight, size, color, or the number of SmartMedia cards. They even want to know if it is comfortable to hold the tablet with one or two hands, if there are any bugs of tablet system, and how it compares with other alternatives, such as Apple iPad Air versus Samsung Galaxy Note. Online reviews, like at Amazon.com, provide a source of this information. Other UGC Web sites include additional information or provide different

perspectives on products and services. For instance, before booking a hotel, people frequently go to Flickr.com to view real hotel photos tagged by other sources rather than simply trusting photos posted online by hotels. As “Photo Fakeouts,” released on Oyster.com (Zeveloff, 2013), shows, many hotels “brush up” photos of rooms, pool, and other facilities to attract more customers. Besides buying a product or acquiring some service, people rely on online reviews for other decision-making scenarios, such as planning a trip or getting a fashion advice. The more informed people are, the better decisions they are likely to make.

As evidenced, the UGC Web sites continue to gain popularity and cover a range of media contents, such as news, blogs, forums, and even open-source software. It shifts the role of media organizations from distributing information to facilitating information distribution to the users. Some of the most popular shared UGC Web sites include Flickr.com, TripAdvisor.com, YouTube.com, and Facebook.com. TripAdvisor, for instance, has 260 million unique monthly visitors and over 125 million reviews and opinions covering more than 3.1 million accommodations, restaurants, and attractions (TripAdvisor, 2014). Similarly, Flickr, as revealed in a report by Verge (2013), has a total of 87 million registered members and more than 3.5 million new images uploaded daily. Facebook, on the other hand, has an estimated 70 million users worldwide. These UGC Web sites provide strategic synergies for traditional media organizations. Google Inc. acquired YouTube for \$1.65 billion (NBCNews, 2006). The basic statistics, provided on YouTube.com, indicate that 100 hr of video are uploaded onto YouTube every minute, and more than 1 billion unique users visit the Web site every month.

Online product evaluations, ratings, and feedbacks can be materially informative. They potentially make informed decisions by learning from others’ experiences that online reviews provide. This form of information-sharing mechanism formulates a type of intelligence known as the wisdom of crowds (Surowiecki, 2004). Instead of using a single expert’s judgment, people rely on the wisdom of a large group of people. A collective opinion of experienced people is considered to be superior to an individual’s judgment (Huang & Chen, 2006). The extensive use of the Internet in everyday life makes the crowd not limited to a certain number of people but the whole public. Users or reviewers on UGC Web sites normally do not know one another. It is free of charge for users to upload contents on shared sites or using/reading the contents on UGC Web sites. Most people perceive reviews in online communities unbiased and trustworthy (PeopleClaim, 2012). In contrast, information uploaded on Web sites by sellers or companies is either selective or skewed and is often considered as a marketing tool rather than being perceived as customer-oriented.

The contents on UGC sharing Web sites, such as online reviews or feedbacks posted by other consumers, lower the barrier of product information between consumers and businesses (Riegner, 2007). In addition, they help reduce the information asymmetry, encourage cooperation, improve efficiency of online markets, and build trust in e-commerce, implicitly supporting its promotion. People are social in a way that their purchasing decisions can be influenced by their friends, neighbors, and coworkers alike, and, particularly, by the information they read (PeopleClaim, 2012).

Online reviews have a huge influence on people’s buying decisions (PeopleClaim, 2012). In detail, an impressive 82% of consumers consider UGC as extremely valuable or helpful in their decision-making. In addition, a 74% increase in product conversion rate has been measured. Overwhelmingly, 12 out of 13 adults expressed that they frequently research products online before purchasing them in stores.

Like other business aspects and other industries, the hotel industry has changed dramatically with emerging technologies and advances in Web applications. Today, instead of calling a travel agent to book an airline ticket or plan a trip, most people visit online platforms (e.g., Expedia.com, TripAdvisor.com) or hotel Web sites to make reservations and generally finish their transactions easily and instantly with full satisfaction and complete soft documentation. These online platforms generally provide bundled services, such as airline ticket booking, car rental, hotel reservations, and restaurant promotions. Planning a trip with ease through the Internet has become a common practice these days. The Internet increased its dominance as a booking channel to 65% this year, with a 10% rise in bookings while travel agency bookings increased by just 4%, resulting in a market share of 24%, as stated in the *ITB World Travel Trends Report 2013/2014* (IPK International, 2014). Also, reviews of hotels, restaurants, airline companies are generated by a large number of customers on these Web sites. Some companies even respond to consumers' comments as they address their concerns and issues to improve their business functions and the company image. In addition to handling customers' issues through UGC, it also provides a convenient platform to launch an effective marketing campaign for enhancing hotels' conversion rates and revenues.

Customers have never been so influential and powerful in reshaping business practices. Now they can effortlessly voice transparently and publicly what they actually experience. Celebrities, especially in online communications, have tremendous sales power in swaying public opinions and must not be overlooked. Communication through UGC not only widens the horizon about how business can be run interactively with their clients, but also opens the field for the clients to exchange ideas and experiences on public platforms.

A survey conducted by TripAdvisor shows that tourists invest lot of time in the planning process for longer trips (TripAdvisor, 2013). A total of 35,042 people across 26 countries participated in the online survey. It found that when people are planning and researching their last trip, online platforms are the main source of travel information (92%), and most people book their accommodations through Web-based travel agencies (27%) and the accommodation providers' Web sites (23%). Fewer than 1 out of 10 booked their last trip through an offline travel agency. TripAdvisor further indicates that online travel sources stand out as being the most trusted sources of travel information. In particular, travel review Web sites are the most trusted (32%) and most useful (38%) sources of information for people as they plan and research their trips.

Following this paper's Introduction is the Literature Review section. The data examined are presented next, as well as the hypotheses conjectured, in the Research Design section. Results are then documented, including some that appear to be counterintuitive. Further examination to discuss the proposed hypotheses and to additionally investigate the reasons for the counterintuitive findings discovered in the Results section is presented in the Analysis section. Managerial Implications of findings are discussed next. Finally, we provide the conclusions of the study and suggest the future direction of research.

## **Literature Review**

The UGC Web sites have gained popularity recently in information systems, marketing, management, and other business disciplines. Dhar and Chang (2009) studied the impact of UGC contents on music sales. The authors showed that the number of UGC contents is positively related to future sales. Leung (2009) examined the reasons of user engagement and participation in UGC Web sites. It showed that users' psychological empowerment (self-efficacy, perceived competence, and desire for control) is enhanced through generating content on UGC Web sites. Chintagunta, Gopinath, and Venkataraman (2010) found that the ability of online word-of-mouth means a user's

rating has a significant and positive effect on box office performance of movies in the U.S. market. Tirunillai and Tellis (2012) researched whether UGC is related to U.S. stock market performance. They found that the volume of chatter has the strongest positive impact on abnormal returns and trading volume.

Schlosser, White, and Lloyd (2006) studied how to convert users into buyers and increase users' online purchasing intentions. Albuquerque, Pavlidis, Chatow, Chen, and Jamal (2012) demonstrated that price promotions have strong effects on purchase decisions, while the content creator referrals and public relations efforts have broader effects impacting all consumer decisions. O'Mahony and Smyth (2009) designed a classification-based recommender system intended to recommend the most helpful reviews for a given product. The authors also evaluated their approach based on TripAdvisor hotel reviews. Ghose, Ipeirotis, and Li (2012) developed a ranking system recommending hotels that provide the best value for the consumer's money. Their ranking system is based on the average utility gain a consumer receives from staying in a particular hotel, and it demonstrates how social media can be mined and integrated into a demand estimation model in order to build a new ranking system in product search engines. Ransbotham, Kane, and Lurie (2012) argued that the value of collaborative UGC is a function both of the direct efforts of its contributors and of its contributors' network. Moe and Schweidel (2012) studied the individual's decision to provide a product rating and research factors that impact this decision. The authors found that positive environment increases posting incidence, while negative ratings environments inhibit posting.

Litvin, Goldsmith, and Pan (2008) designed a word-of-mouth flow diagram and proposed a set of strategies for hospitality and tourism providers. Mangold and Faulds (2009) indicated that social media is a hybrid component of promotion mix because it empowers consumers to communicate directly with one another. Miguens, Baggio, and Costa (2008) examined a case study on the city of Lisbon, Portugal, with UGC on TripAdvisor. The authors further discussed the dramatic changes posed by new forms of collaboration and business models. Noone, McGuire, and Rohlfs (2011) proposed a framework for assessing social media-related revenue management opportunities. Talwar, Jurca, and Faltings (2007) investigated two sources of information including linguistic evidence from the textual comment from a review and patterns in the time sequence of reports. The authors found that groups of users who actively discuss a given feature are more likely to agree on a common rating for that feature based on reviews on the TripAdvisor Web site. Xiang and Gretzel (2010) showed that social media play an essential role in the search results, signifying that search engines likely guide travelers towards social media sites. Zhang, Ye, Law, and Li (2010) demonstrated that UGC about the quality of food, environment, and service of restaurants, as well as the volume of online consumer reviews, are positively correlated with the online popularity of restaurants.

## **Research Design**

### **Sample Data**

To analyze the impact of UGC on customer decision-making in the travel industry, we write Java crawler and download the hotel ratings from TripAdvisor.com. TripAdvisor is considered to be the largest platform among travel review Web sites, with 32 million members and over 100 million reviews and opinions posted on hotels, restaurants, attractions, and other travel-related businesses. There are other trip-planning Web sites as well. They include Hotels.com, with over 6.5 million reviews; Yahoo Travel, which is in second place with an estimated 36 million unique monthly visitors; and Booking.com, with an estimated 35 million unique monthly visitors. According to an

online article at eBizMBA (2014), TripAdvisor remains in the lead command, with the largest volume of estimated 38 million unique monthly visitors.

The ratings of hotels are measured using seven criteria: value, room, location, cleanliness, check-in, service, and overall. TripAdvisor.com provides travelers a platform to evaluate hotels after their stay. The users usually evaluate hotels on these seven dimensions. For each of these dimensions, they assign a rating on a 5-point scale, with the higher number indicating that the customer is more satisfied with the hotel in that category.

The downloaded data set includes 105,059 user reviews gathered from 1,642 hotels worldwide. The average number of reviewers per hotel is 364.5, the average year-round price is \$277.60, and the average of overall ratings is 4.0. Also, we break down the reviews into two categories: reviews for hotels in the United States and the reviews for hotels outside the United States, or simply “non-U.S.” If a hotel is in the United States, the dichotomous (0, 1) classification variable U.S. is denoted as 1, 0 otherwise. Of the total 1,642 hotels rated by the hotel customers, 564 (34.34%) are U.S.-based hotels, and 1,078 (65.66%) are non-U.S.-based hotels. The brief descriptive statistics of the hotel data are summarized in Table 1.

**Table 1: Summary of Hotel Samples Grouped by U.S. and Non-U.S.**

Country	Number of Reviews	Average Year-Round Price	Overall Rating	N (Observed)
U.S.				
Maximum	1,223	\$997	5	
Minimum	13	\$62	1	36,430
Average	272.6	\$277.80	3.9	
Non-U.S.				
Maximum	2,686	\$908	5	
Minimum	13	\$30	1	68,629
Average	413.2	\$277.50	4.1	
Total				
Maximum	2,686	\$997	5	
Minimum	13	\$30	1	105,059
Average	364.5	\$277.60	4	

From Table 1, we notice that the average price is about the same for hotels in the United States and those in other countries. The average number of reviews for non-U.S. hotels is larger than those located in the United States. The largest number of reviews received is on the Excellence Punta Cana, a hotel located in Dominican Republic. The hotel has received over 2,500 reviews internationally and carries the most expensive price tag of \$908. Domestically, the most expensive hotel is Michelangelo in New York City, New York, with a price tag of \$997. The lowest year-round average price of a hotel internationally is \$30, offered by Hostal Cruz Sol, Madrid, Spain, and domestically is \$62, charged by the Taylor Hotel in San Francisco, California. The Travelodge in Phoenix, Arizona, and Clarion Hotel in downtown Los Angeles, California, have received the least number of reviews, although they are not the cheapest hotels.

We further classify hotels into two groups based on their destination cities. Using the list from the *Global Destination Cities Index Report* (Hedrick-Wong & Choog, 2013), hotel locations have been classified into two categories. The report lists the top 20 destinations visited by international travelers in 2013. In the United States, New York (ranked 5th) and Los Angeles (ranked 20th) are on the “Top 20” list. The top three destinations internationally are Bangkok in Thailand, London in United Kingdom, and Paris in France. A partial list of these popular destinations is presented in Table 2.

**Table 2: Global Top 20 Destination Cities Sample**

Country	Rank	City	# of Overnight Visitors
U.S.	5	New York	11.52 million
	20	Los Angeles	4.84 million
Non-U.S.	1	Bangkok	15.98 million
	2	London	15.96 million
	3	Paris	13.92 million

If a hotel is from the top 20 list, the dichotomous classification variable *top20* is coded 1, 0 otherwise. Among the hotels, 562 are from top 20 destinations, and 1,080 are from other destinations. A breakdown with relevant statistics is given in Table 3. The average number of reviews from the top 20 group is about half the average volume of the others. The average year-round price is a little bit less than \$280 for hotels in both groups. In the top 20 group, however, the Michelangelo hotel in New York City, as noted earlier, tops the price list at \$997. In the others group, the Excellence Punta Cana, located in Dominican Republic, has received the largest number of reviews—specifically, over 2,500—and is the most expensive hotel with a price tag of \$908.

**Table 3: Summary of Hotel Samples Grouped by Top 20 and Others**

	Number of Reviews	Average Year-Round Price	Overall Rating	<i>N</i> (Observed)
<b>Top 20</b>				
Maximum	1,223	\$997	5	
Minimum	13	\$38	1	34,772
Average	241.3	\$279.90	4.2	
<b>Others</b>				
Maximum	2,686	\$908	5	
Minimum	13	\$30	1	70,287
Average	425.4	\$276.50	4	

In addition, an examination of hotel ratings at different price levels can provide valuable information users may consider in their decision-making. A price classification variable is defined at three levels to identify hotels as low-priced, medium-priced, and high-priced. In order to divide hotels into three price groups, we proceed as follows: First, we sort the hotel prices from high to low. Then, we evenly make the first one third of price range (highest price to lowest price) as the high-priced group, the second third of price range (highest price to lowest price) as the medium-priced group, and the last

third of price range (highest price to lowest price) as the low-priced group. The three price groups are generated based on the cutoff values of prices identified. The distribution of hotel data by price groups is summarized in Table 4. The average numbers of reviews on the low-, medium-, and high-priced groups are 155.5, 236.3, and 521.2, respectively. Interestingly, a little over half of the reviews come from the high-priced group. This might imply that when people pay more for hotel stay, they're more inclined to review the stay experiences. On the other hand, high-priced hotels are more sensitive to customers' relations and allocate more resources to stimulate consumers to write comments. The average year-round prices are, respectively, \$139.1, \$215.3, and \$367.9 for the three groups. Preprocessing and coding the data are primarily implemented via Microsoft Access before running statistical analysis. Hotels without price information or unknown hotels are not included in the analysis.

**Table 4: Summary of Selected Hotel Review Samples by Hotel Price Groups**

Price Group	Number of Reviews	Average Year-Round Price	Overall Rating	<i>N</i> (Observed)
Low				
Maximum	552	\$174	5	
Minimum	13	\$30	1	20,062
Average	155.5	\$139.1	3.7	
Medium				
Maximum	1,213	\$252	5	
Minimum	13	\$175	1	32,051
Average	236.3	\$215.3	4.0	
High				
Maximum	2,686	\$997	5	
Minimum	17	\$253	1	52,946
Average	521.2	\$367.9	4.1	

## Hypotheses

Four major pairs of hypotheses are postulated in this section. First, we want to study the relationship of overall rating with price levels. The online reviewers post overall ratings on TripAdvisor for hotels that they lodge in. The overall ratings measure how lodgers evaluate hotel services and facilities across the board. As described above, we split hotels by price into three groups: low, medium, and high. Generally speaking, hotels with better facilities and services are priced higher. With different price levels, different stay experience should be expected. Thus, we conjecture that overall ratings are different among various price levels:

*Hypothesis 1<sub>0</sub>*: The averages of overall ratings of hotels across different price levels are indifferent, i.e.,  $\mu_i = \mu_j$ , where  $i, j \in \{low, medium, high\}$ .

*Hypothesis 1<sub>1</sub>*: The averages of overall ratings of hotels across different price levels are different, i.e.,  $\mu_i \neq \mu_j$ , for at least one pair  $(i, j)$ , where  $i, j \in \{low, medium, high\}$ .

When consumers book hotels, they most likely expect to get a good value for their dollar. Generally, consumers expect different values from hotels with various price levels. Therefore, we surmise that value ratings are different among three hotel price levels. The hypotheses can be stated as follows:

*Hypothesis 2<sub>0</sub>*: The averages of value ratings of hotels across different price levels are indifferent, i.e.,  $v_i = v_j$ , where  $i, j \in \{low, medium, high\}$ .

*Hypothesis 2<sub>1</sub>*: The averages of value ratings of hotels across different price levels are different, i.e.,  $v_i \neq v_j$ , for at least one pair  $(i, j)$ , where  $i, j \in \{low, medium, high\}$ .

Included in Table 1 are 68,629 reviews from international locations. Increasingly, nowadays, more people are traveling overseas for business or for the purpose of leisure. In most cases, staying at hotels is an integral part of their trips, whether domestic or international. By reviewing data contained in Table 1, it is surprising to note that the overall average ratings for hotels in the United States and overseas are 3.9, and 4.1, respectively. The overall average rating of hotels in the United States is lower than that of their counterparts in other countries. It would be of interest to the hotel industry to find out if the observed difference in ratings for the two groups is significant or not. The following hypotheses, thus, are surmised:

*Hypothesis 3<sub>0</sub>*: The average of overall ratings of hotels in United States is not different from that of hotels in other countries.

*Hypothesis 3<sub>1</sub>*: The average of overall ratings of hotels in United States is different from that of hotels in other countries.

As discussed in Section 3, the hotel locations have been classified into two categories based on if they are on the top 20 list of *Global Destination Cities Index Report* or from other destinations. Top destinations drive traveler arrivals and spending. However, it costs more for hotels in top destinations, such as New York or London, to have unrivaled space and proximity as compared to hotels in less densely populated cities. It is less likely to expect that customers would feel comfortable or satisfied with tightly designed rooms and congested areas. On the contrary, as witnessed in Table 2, the observed data do not seem to provide a strong evidence for that conclusion. We find that the overall average ratings for the top 20 hotels and others are very close, specifically and respectively 4.2 and 4.0 in Table 2. It is, therefore, of further interest to conclusively examine if the observed difference, as reported, is statistically significant. We thus set forth the following hypotheses:

*Hypothesis 4<sub>0</sub>*: The average of overall ratings of hotels from top 20 destinations is not different from that of hotels from other places.

*Hypothesis 4<sub>1</sub>*: The average of overall ratings of hotels from top 20 destinations is different from that of hotels from other places.



## Results

We use SAS Enterprise Guide Version 5.1 for statistical analysis. Because we are interested in comparing the means of the ratings from various groups, an independent-sample  $t$  test, one-way ANOVA test, and Kruskal–Wallis test (Kruskal & Wallis, 1952) are conducted to verify if the proposed hypotheses can be statistically supported. Both the  $t$  test and one-way ANOVA are parametric tests, which assume data attributes conforming to certain statistical distributions. The  $t$  test is used to compare the means ascribed to two groups. The assumption is that each population follows a normal distribution and the variances of the two populations are the same. When the two populations have unequal variances, however, the Welch–Satterthwaite test is appropriate.

The one-way ANOVA test is a generalized  $t$  test for comparing more than two groups, and it relies on similar assumptions. The Kruskal–Wallis test—the nonparametric analogue of the one-way ANOVA test—on the other hand, does not make the assumption of normality. Without knowing the distribution of the data, the Kruskal–Wallis test can provide an analysis with an alternative perspective. However, the Kruskal–Wallis test assumes that groups under comparison follow distributions which are identically shaped and scaled. The Tukey's honest significant difference (HSD) test performs multiple comparisons for testing pairwise group means differences.

### Overall Rating and Price Level

The test results are presented in Table 5. The Hypothesis  $H_0$  is rejected at 95% confidence level (CL). Because the  $p$  value is negligible, it suggests that the overall ratings of hotels at three price levels are significantly different. It can then be inferred that the overall rating is correlated with price level.

**Table 5: Overall Rating by Price Levels (ANOVA)**

Source	<i>df</i>	Sum of Squares	Mean Square	<i>F</i> Value	<i>Pr</i> > <i>F</i>
Model	2	2,342.0429	1,171.0215	875.14	<.0001
Error	105,056	140,574.9440	1.3381		
Corrected total	105,058	142,916.9870			
Root mean square error	1.156761				
Overall rating mean	4.035313				
Coefficient variable	28.66594				

*Note.* Number of observations read = 105,059; number of observations used = 105,059; *df* = degrees of freedom; *Pr* = probability.

### Value Rating and Price Level

Similarly, we perform ANOVA for the value rating as shown in Table 6. The results show that the average value ratings are significantly different among hotels at different price levels. Thus, the result is in favor of the Hypothesis 2<sub>1</sub> to conclude that the value ratings of hotels are correlated with their price levels.

**Table 6:** Value Rating by Price Levels (ANOVA)

Source	<i>df</i>	Sum of Squares	Mean Square	<i>F</i> Value	<i>Pr</i> > <i>F</i>
Model	2	504.6152	252.3076	187.54	<.0001
Error	105,056	141,333.7981	1.3453		
Corrected total	105,058	141,838.4133			
Root mean square error	1.159879				
Value rating mean	3.983505				
Coefficient variable	29.11704				

*Note.* Number of observations read = 105,059; number of observations used = 105,059. *df* = degrees of freedom; *Pr* = probability.

### U.S. Versus Non-U.S. Ratings

To compare the means of the ratings from the two independent hotel groups, U.S. and non-U.S., the *t* test and Kruskal–Wallis test are conducted to check which hypotheses are favored statistically. As displayed in Table 7, the overall ratings are correlated with a U.S./non-U.S. indicator. Because the *p* value is negligible with 95% CL, Hypothesis 3<sub>0</sub> is rejected and there are significant differences between the average overall ratings of domestic and international hotels.

In addition, we perform *t* tests for the other six ratings as well, and the results reported in Table 7 show that all ratings ascribed to hotels in the United States are significantly different from those pertain to the non-U.S. hotels. The six ratings of hotels in the United States are considerably lower than those computed for hotels in other countries. Among those rating categories, the largest gaps between the United States and its international counterparts can be observed in terms of cleanliness, overall, and value ratings. The meaning of these findings is twofold. Firstly, the travelers generally more appreciate a better and more enjoyable experience (cleaner rooms, better values, etc.) when lodging in overseas hotels. Secondly, from the domestic hotel management and/or lodging industry perspective, this suggests room for improvement in all aspects.

**Table 7: Satterthwaite's Approximate t Test by U.S. (1) and Non-U.S. (0)**

Dependent Variable	Difference	t Value	Pr >  t
Overall rating	.1971	25.6	<.0001
Value rating	.1654	21.57	<.0001
Room rating	.1436	18.95	<.0001
Location rating	.0728	11.73	<.0001
Cleanliness rating	.1992	28.64	<.0001
Check-in rating	.0660	8.81	<.0001
Service rating	.1337	17.65	<.0001

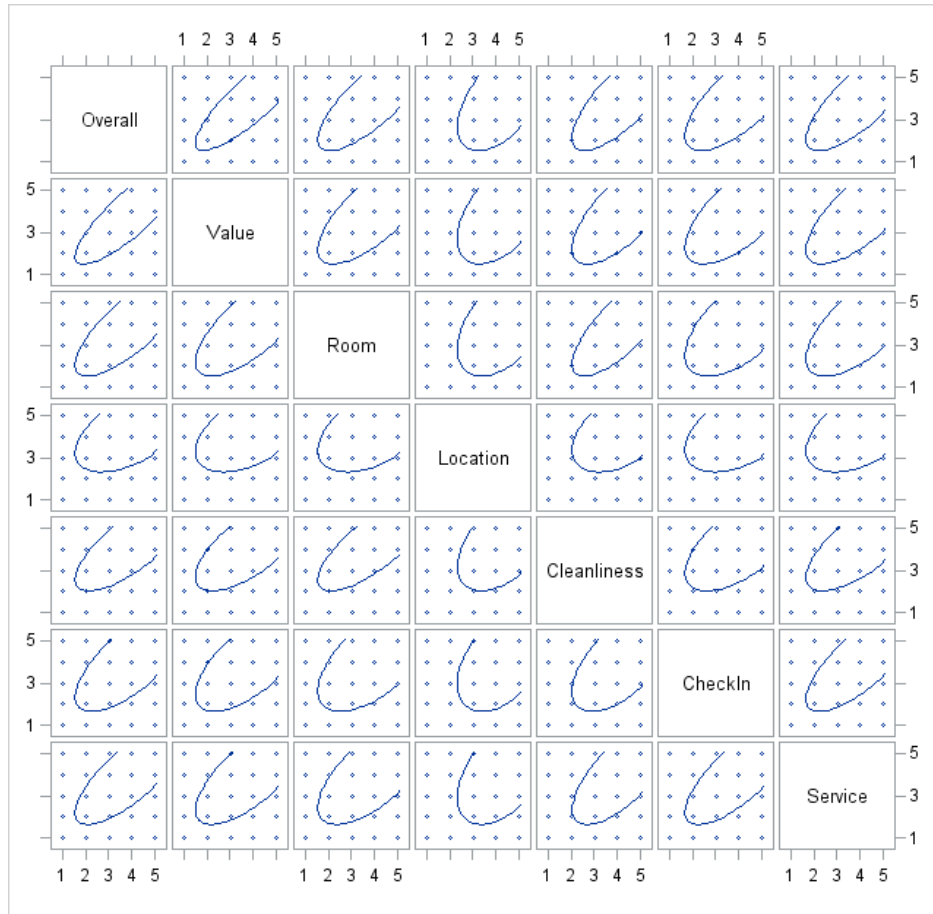
Note. *df* = degrees of freedom; *Pr* = probability.

To further understand the relationship across the seven ratings in Table 7, we compile results of a correlation analysis on the ratings by computing the Pearson correlation coefficients. They are recorded in Table 8 and depicted in the corresponding Figure 1. These coefficients in Table 8 clearly show that the overall rating is highly correlated with the other ratings except the rating for location. The value rating is also highly correlated with other ratings except the location and the check-in ratings. We see that the correlation coefficient between overall and value rating is 0.85542, and the correlation coefficient between check-in and location rating is 0.47127.

**Table 8: Pearson Correlation Coefficients**

	Room	Location	Cleanliness	Check-in	Service	Overall
Value	0.72972	0.52184	0.70471	0.67836	0.72541	0.85542
Room		0.48145	0.77172	0.59526	0.66805	0.79025
Location			0.47829	0.47127	0.48733	0.55364
Cleanliness				0.61534	0.70818	0.75906
Check-in					0.76298	0.71774
Service						0.78274

From the Pearson correlation coefficients portrayal in Figure 1, we see that a quite thin U-shaped curve is observed from the upper left part of Figure 1, while wider curves are observed in the middle section. The narrower the U-shaped curve, the stronger the correlation between the pair ratings. It shows that the overall rating is strongly correlated with value rating and room rating, while location rating is less strongly correlated with other ratings.



**Figure 1: Pearson Correlation Coefficients on Ratings**

**Ratings of Top 20 Destinations Versus Others**

We now compare the means of the ratings computed for the two independent hotel groups defined earlier—those located at top 20 destinations and others—by performing a *t* test and Kruskal–Wallis test. As shown in Table 9, the hotel overall rating is correlated with the top 20 indicator. Because the *p* value is negligible, with 95% CL, the null Hypothesis  $H_0$  is rejected, suggesting that there are significant overall rating differences between hotels from the popular destinations and other locations.

We further perform a *t* test for the other six ratings as well, and the findings are entered in Table 9. These findings indicate that the averages of all ratings are significantly different between the top 20 group and the others group.

**Table 9: Satterthwaite's Approximate  $t$  Test by Top 20 (1) and Others (0)**

Dependent Variable	Difference	$t$ Value	$Pr >  t $
Overall rating	-.2229	-30.5	<.0001
Value rating	-.1204	-16.43	<.0001
Room rating	-.1788	-24.63	<.0001
Location rating	-.1182	-20	<.0001
Cleanliness rating	-.2152	-33.4	<.0001
Check-in rating	-.1896	-26.35	<.0001
Service rating	-.1471	-20.34	<.0001

*Note.*  $df$  = degrees of freedom;  $Pr$  = probability.

All ratings in the top 20 group are significantly higher than those from their counterparts. The largest gap is observed in the overall rating, followed by the cleanliness and check-in ratings. These findings demonstrate that hotels in the popular destinations outperform their competitors in all areas of evaluation.

## Analysis

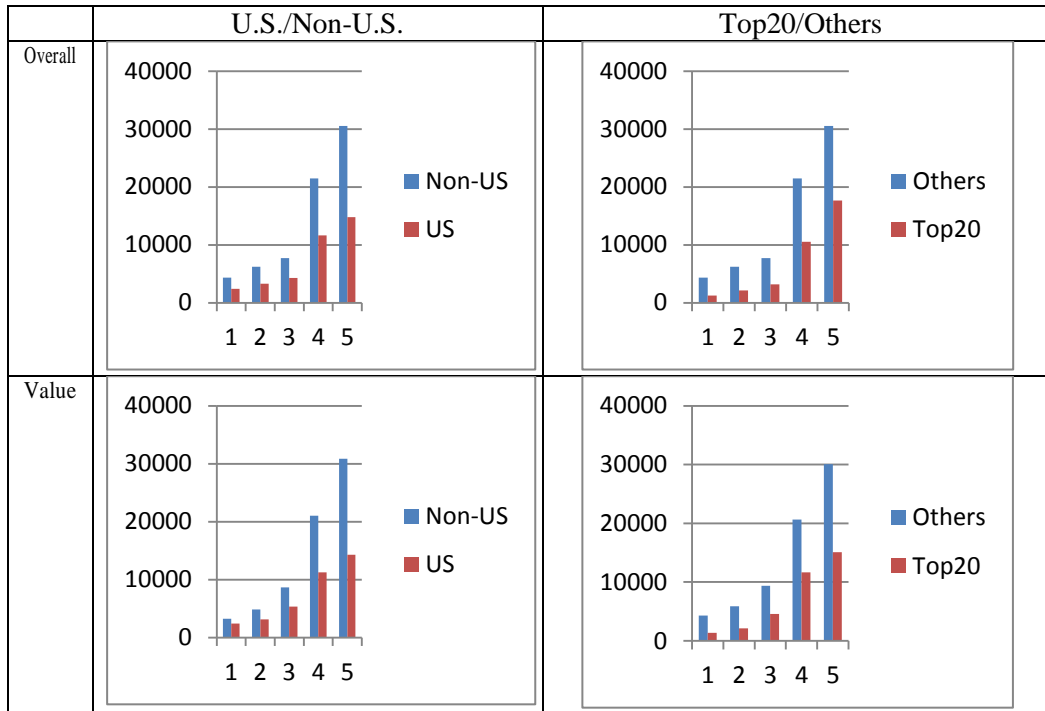
The outcomes of hypothesis testing with ANOVA and  $t$  test have been discussed in the Results section. However, the assumption of data conforming to a normal distribution does not necessarily hold for the downloaded online data. Because the normality assumption is not required in Kruskal–Wallis tests, in this section, we examine the hypotheses with Kruskal–Wallis tests. We find that the results of Kruskal–Wallis tests are consistent with and support the findings presented earlier.

In addition, we investigate some counterintuitive results found in the Results section. The results show that hotels in the United States have significantly lower ratings than hotels outside the United States. Intuitively, the United States is perceived to be a far advanced country and a service-oriented society. We review this issue further to examine the reasons behind what appears to be inconsistent with perceived expectation.

Furthermore, we examine if the ratings are independent of price levels. As expected, the price generally moderates service level and product quality. Additional tests are undertaken to discover the effect of the price factor on ratings.

### Ratings and Price Levels

It is observed that the data on ratings do not necessarily follow a normal distribution. We draw bar charts in Figure 2, which support the inference. The Kruskal–Wallis test, a nonparametric analogue of one-way ANOVA, does not require the normality assumption. We use this test to examine the validity of the proposed hypotheses. Remarkably, the findings of the test support the results found earlier.



**Figure 2: Bar Charts of Overall and Value Ratings**

For the normality assumption that is not necessarily valid, we further perform the nonparametric Kruskal–Wallis test and find the results, shown in Table 10, consistent with the one-way ANOVA (Tables 5 and 6) entertained earlier. Noticeably, the chi-squared value for the value rating found in Table 10 is 274.7828, which is the lowest among all ratings considered.

**Table 10: Kruskal–Wallis Test by Price Levels**

Dependent Variable	<i>df</i>	$\chi^2$	<i>Pr</i> > $\chi^2$
Overall rating	2	2,068.3755	<.0001
Value rating	2	274.7828	<.0001
Room rating	2	3,658.4166	<.0001
Location rating	2	1,291.6013	<.0001
Cleanliness rating	2	2,296.7088	<.0001
Check-in rating	2	933.7428	<.0001
Service rating	2	1,741.1200	<.0001

*Note.* *df* = degrees of freedom; *Pr* = probability.

The Tukey’s test is used for pairwise comparison, that is, high versus medium, medium versus low, and low versus high; the results are summarized in Table 11. Surprisingly, with 95% CL, these results show that the average value rating for high-priced group is not statistically different from that of the medium-priced group.

**Table 11: Tukey's Studentized Range Test for Value Rating**

Price Groups Comparison	Difference Between Means	Simultaneous 95% CL
Medium – low	0.183156	[0.158684, 0.207629]***
High – medium	-0.011744	[-0.030983, 0.007495]
High – low	0.171412	[0.148875, 0.193950]***

Note. CL = confidence level.

\*\*\* Comparisons significant at 0.05 level.

As shown Table 11, the HSD test suggests that higher-priced hotels do not necessarily guarantee higher value ratings when comparing with medium-priced hotels. The two groups cannot be distinguished statistically in terms of the average value rating. For travelers, simply pursuing high priced hotels without considering other factors may not be a smart thing to do. The medium-priced hotels provide the value level of services comparable with the high-priced hotels. The price differential between high-priced and medium-priced hotels is not translated to convince difference in service levels provided by them. The observed data provide no evidence to support the general strategy for travelers to simply pursue high-priced hotels to get the best value for their dollar. We also perform the HSD test for the overall rating and find that all pairwise comparisons reflected in Table 12 are significant at 0.05 level.

**Table 12: Tukey's Studentized Range Test for Overall Rating**

Price Groups Comparison	Difference Between Means	Simultaneous 95% CL
Medium – low	0.303239	[0.278308, 0.328170]***
High – medium	0.097680	[0.078081, 0.117279]***
High – low	0.400919	[0.377960, 0.423878]***

Note. CL = confidence level.

\*\*\* Comparisons significant at 0.05 level.

Other ratings, such as those related to room and location, are also analyzed to see if the means of these ratings vary with price levels. Additional *F* tests are conducted and described in Table 13. Based on the results of *F* tests, the averages of ratings are found to be significantly different for hotels falling in different price ranges. The Tukey's tests are also conducted and similar results are observed. The space limitation prevents the results of on the other five ratings to be included in this study.

**Table 13: F Test by Price Groups**

Dependent Variable	<i>df</i>	<i>F</i> Value	<i>Pr</i> > <i>F</i>
Room rating	2	1,662.57	<.0001
Location rating	2	628.18	<.0001
Cleanliness rating	2	1,136.46	<.0001
Check-in rating	2	382.88	<.0001
Service rating	2	660.50	<.0001

Note. *df* = degrees of freedom; *Pr* = probability.

### Ratings by U.S. and Non-U.S.

Again, the Kruskal–Wallis test is performed on ratings achieved by hotels in the two categories—U.S. and non-U.S. The results are presented in Table 14, which are found to be consistent with findings reported in the Results section. Even though all ratings illustrate a significant difference between domestic and international hotels, the check-in and location ratings are found to have relatively small chi-squared values, while cleanliness and overall ratings capture high values. This suggests the existence of a large gap between hotels in the United States and other countries when it comes to cleanliness, as well as overall ratings. On the contrary, the gap seems to be marginal between the two groups in terms of the check-in function and the hotel location.

**Table 14: Kruskal–Wallis Test by U.S. and Non-U.S.**

Dependent Variable	<i>df</i>	$\chi^2$	<i>Pr</i> > $\chi^2$
Overall rating	2	739.2868	<.0001
Value rating	2	465.0769	<.0001
Room rating	2	332.9663	<.0001
Location rating	2	89.7473	<.0001
Cleanliness rating	2	877.1406	<.0001
Check-in rating	2	71.9317	<.0001
Service rating	2	329.2018	<.0001

*Note.* *df* = degrees of freedom; *Pr* = probability.

A series of Kruskal–Wallis tests is performed to further identify if, given various price levels, the averages of overall (or value) ratings are different between domestic hotels and international ones. The results of the tests can be found in Table 15. Because the *p* values are all negligible, we conclude that there are significant overall and value rating differences between U.S. and non-U.S. hotels, given three price levels. This provides insights suggesting that hotels in the United States have significantly lower ratings than hotels in other countries across various price levels. This is revealing because the United States is the most advanced country and has been long known for its leading service posture around the globe.

**Table 15: Kruskal–Wallis Test by U.S. and Non-U.S. for Overall and Value Ratings**

Dependent Variable	Price Level	$\chi^2$	<i>Pr</i> > $\chi^2$
Overall rating	High	75.7373	<.0001
	Medium	361.6259	<.0001
	Low	741.3056	<.0001
Value rating	High	167.2557	<.0001
	Medium	86.88	<.0001
	Low	293.9409	<.0001

*Note.* *df* = degrees of freedom; *Pr* = probability.



## Ratings by Top 20 Versus Others

We also perform Kruskal–Wallis tests for the ratings between top 20 destinations and others, and the results are summarized in Table 16. A noticeable consistency in findings with those discussed in the Results section is observed. Even though all ratings are significantly different between top 20 and the others category, value and service ratings have relatively small chi-squared values, whereas both cleanliness and overall ratings drive large values. This implies a large gap in terms of cleanliness as well as overall ratings that separates the top 20 and other hotels. On the flip side, a small gap in terms of value and service between the two brings them closer.

**Table 16:** *Kruskal–Wallis Test by Top 20 and Others*

Dependent Variable	<i>df</i>	$\chi^2$	<i>Pr</i> > $\chi^2$
Overall rating	2	767.7992	<.0001
Value rating	2	108.8415	<.0001
Room rating	2	490.2190	<.0001
Location rating	2	323.6020	<.0001
Cleanliness rating	2	958.7563	<.0001
Check-in rating	2	564.5140	<.0001
Service rating	2	243.5427	<.0001

*Note.* *df* = degrees of freedom; *Pr* = probability.

## Managerial Implications

Pursuant to the pairwise comparison between medium and high-priced groups, we find that the value rating of the high-priced hotels group is not statistically higher than that of the medium-priced hotels group. This provides interesting and meaningful statistical evidence that the higher price tag does not necessarily or normally bring equally higher value for the lodgers. From the high-priced hotel managers' perspective, however, this propels the incentive for them to probe and figure out how to add more value for their guests or else justify the higher tag.

Overall, across the seven ratings examined in this study, including the overall, U.S. hotels consistently score lower than those located internationally. The findings suggest that there is clearly a serious need for improvement in the U.S. tourism industry. On its face, it appears to be counterintuitive, as the United States is widely perceived to be a leading service society. However, the UGC information and data scrutiny portray a different picture. One might argue that the hotel mix drawn from the TripAdvisor.com might be inherently undifferentiating between the United States and international. Perhaps the international hotels are more (in terms of percentage) high end. However, the findings show that, across price levels, U.S. hotels consistently score lower than other countries in the overall and service ratings.

Significant differentials within each price range, noticed across cleanliness and overall ratings between the two groups, are difficult to overlook without toll. Substantive improvements in these areas are highly imperative and recommended if the domestic hotels intend to stay competitive and seek an edge in the hospitality industry in the UGC era.

## Conclusion and Future Research

The UGC continues to provide profound and meaningful decision-making information for online users. Traditionally, hotel lodgers rely on hotel star systems as well as travel agencies when booking hotels. That trend, however, is changing fast as the technology offers other cheaper and speedier options. TripAdvisor provides a major platform with abundant UGC in the hotel industry worldwide.

We have investigated the relationship between seven ratings on hotels posted by TripAdvisor reviewers and hotel price levels, U.S. and non-U.S. hotels, as well as top 20 versus other destinations, respectively. The overall ratings are significantly different for hotels at different price levels (low, medium, and high). The overall rating of hotels at the high price level is significantly higher than that of hotels at medium or low price level. The overall rating of medium priced hotels is higher than that of low priced hotels. However, for the value rating, the pairwise comparison between medium- and high-priced groups shows that the value rating of the high-priced group is not statistically different from that of the medium-priced group. When the two price groups are compared, the higher price hotel consumers, who pay more for their hotel stay, don't necessarily receive higher value from their stay experiences. The general strategy for hotel clients is to look for medium-priced hotels to position themselves for best value.

In addition, for hotel customers, when planning international trips, lodging in popular destinations might be more rewarding and worthwhile in terms of value. This study also shows that the ratings of U.S. hotels are significantly lower than those of non-U.S. hotels. It suggests that the hotel industry in the United States needs to be improved to be comparable with those in other countries.

In future research, we plan to incorporate star evaluations as well in our study for exploring the relationship between the public user-generated ratings and the stars evaluations from the critics. Mining comments from the UGC is highly likely to shed some light on the valuable hidden information. Also, it might be potentially beneficial to expand the UGC-based research to other industries to guide the online users with insight for informed decision-making. For instance, assimilating the information with transportation ratings and costs can potentially provide more insight than the current research does. In addition, we plan to investigate other interesting problems, such as incorporating all factors into a model and studying the partial effects and interaction effects of the factors. Also note that a portion of online reviews may be fake. Companies may hire persons to write reviews to manipulate online opinions. It can be very interesting to study the effect of manipulated reviews on consumers' purchase decisions.

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