Investigating the Effectiveness of Helpful Reviews and Reviewers in Hotel Industry

by Universitas Internasional Semen Indonesia

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Abstract. With the growth of e-commerce, online consumer reviews have become important attributes that influence purchasing decisions. Especially, hotel industry has strongly influenced by online reviews due that most tourists cannot experience all hotels personally and the service levels among hotels are very different. However, the flood of online consumer reviews has caused information overload, making it difficult for consumers to choose reliable reviews. Therefore, helpful remarks of hotel review should potentially have strong influence on users. Previous research focused on how to predict the helpful scores of reviews, but it has not explored the influence of reviews marked with helpfulness. The aim of this study is to investigate whether the helpful reviews and reviewers who contribute many reviews really have effects on the marks hotel received. With analysis of reviews contributed in Tripadvisor.com for three hundred hotels scattered in ten cities of U.S., this study found both reviewer contribution, and helpful review has a positive effect on marks of hotels. Moreover, the research also discovered that the helpfulness of reviews is negatively relates to the ratings. Also, the research found that the standard deviation of review mark is positively relates to hotel ranks.

Keywords: Online ratings · Helpful reviews · On-line hotel reviews
Tripadvisor

1 Introduction

The tourism and hotel industry provide intangible services, falling under short-term experiential consumption. Consumers are quite dependent on Internet word-of-mouth when making a purchasing decision. The survey results show that among consumers', most searched hotel community websites and review websites, Trip Advisor and AAA websites rank the highest. In the past, factors affecting helpful reviews showed contradictions. Some scholars studied important factors affecting helpful reviews, such as review characteristics, product type, review length, and so on, all of which intended to

find factors affecting consumers' determination of helpful reviews. Travel review websites often use "helpful reviews" as indicators that aid in evaluating review quality. Other studies found that "rating" directly affected sales, rating and sales showed non-linear growth. A high rating does not affect high sales. When the rating is between 4.2 and 4.5, it means positive reviews affect sales and consumers' purchase rate increases.

Therefore, the purpose of this study is to explore whether reviews labeled "helpful" affect hotel owners, thereby exploring whether the influence of message senders affect hotel owners. The hotel reviews targeting the top ten popular scenic spots in North America on global travel review website Trip Advisor will adopted as research participants.

This paper organized as follow: (1) Introduction: research background, motivation and purpose. (2) Related work: a review of attributes of helpful reviews and message senders. (3) Research methodology: content of research process in this study. (4) Statistical analysis: experimental results and the discussion of the test results; (5) Conclusion and future research: contribution of the study and possible future research direction is discussed.

2   Related Work

2.1   Attributes of Helpful Reviews

According to a survey report of TheSkift.com, Internet reviews are one of the top three important factors for hotel reservations. About 89% global travelers and 64% global hotel owners find Internet reviews to have an influence on hotel reservations. Helpful voting is the most commonly used indicator for consumers to measure whether a review is helpful. Therefore, many scholars are searching which reviews are helpful. As showed in Table 1, numerous previous studies carried out research targeting factors voted as helpful reviews. Hence, five factors would compiled in this study: message sender characteristic, review rating, and review characteristic such as emotional characteristic, readability, and quality.

In view of past scholars' research that explore helpful review attributes, it was found that message sender characteristics, review ratings, the emotional characteristics of review contents, readability, and quality factors are all relevant factors affecting helpful reviews. This study explored whether helpful reviews and message senders produce actual impacts on consumers, which have a complementary relationship with the factors found above. In this paper, Trip Advisor travel reviews were adopted as examples. According to information provided in reviews, including the "like" clicks the review receives, review rating, the "like" clicks the message sender receives, and the message sender's total review contribution quantity divided into review attributes and message sender attributes.

Table 1. Summary of helpful review attributes in past research

Research	A	S	R	Q	F	Product	Source
Kim et al. (2006) [5]	✓	✓		✓		MP3/Digital Camera	Amazon
Ghose and Ipeirotis (2007) [4]	✓	✓	✓	✓	✓	Video Player/Digital Camera/Video CD	Amazon
Liu et al. (2007) [6]		✓	✓	✓		Digital Camera	Amazon
Otterbacher (2009) [10]	✓		✓	✓	✓	Electronic Product/Video CD/Software	Amazon
O'Mahony and Smyth (2010) [9]	✓	✓		✓		Hotels	TripAdvisor
Mudambi and Schuff (2010) [8]				✓	✓	MP3/Video CD/Video Game Console/ Smart Phone/Digital Camera/Laser Printer	Amazon
Cao et al. (2011) [1]				✓	✓	News	CNET
Pan and Zhang (2011) [11]	✓			✓	✓	Video CD/Video Game Console/Electronic Product/Software/Health Care Products	Amazon

2.2 Review Attributes and the Attributes of Message Senders Adopted in This Study

Review attributes divided into review ratings and the review "like" clicks a review receives. Review rating is the most direct expression of a review's product attitude. On the other hand, "like" clicks indicate consumers find information provided in a review to be helpful.

1. Review Rating: When the consumer browses reviews on a review website, compared to review contents, review ratings had better enable consumers to obtain information within a short period time. Review ratings are usually review indicators, ranking from ratings of 1–5 that represent a comprehensive assessment of a product or service [11]. Since consumers' time and attention are limited, it is more difficult to read all determinable items in a large quantity of reviews. With simplified numerical values, information could easily understand, thus reducing information-processing complexity. This study deems "rating" to facilitate consumers' quick reading of product information contained in the Internet reviews with an information overload.

2. Review "Like" Clicks: Review websites assist consumers in speeding up purchase decision-making. After the consumer finished viewing others' reviews and found the information in a review to be helpful to consumers, the "voting" function used to inform consumers the review is a helpful one. When a review voted by consumers to be helpful, it means: (1) the review has been read; (2) the review is valuable to consumers and may affect purchase decision-making; (3) the review can

provide more information compared to reviews with no vote. Hence, this study deems that the "like" clicking behavior of consumers after reading a review indicates the review was helpful to consumers.

At present, many eWOM researches involve user contribution behaviors, such as their sharing motivation or self-awareness [3, 12] found in their study that the message sender's characteristics change with varied degrees of contribution, indicating relevance between the message sender's contribution degree and the message sender's characteristics. According to [2], users' information shared on social networking platforms or review websites affect consumers' decision prior to making a purchase. This paper deems that when the message sender shares personal experience, knowledge, or feelings for a particular field, the higher the information contribution, the higher the involvement in the field and more knowledge and experiences accumulated.

3 Research Methodology

The research process is showing in the following Fig. 1. Firstly, we describe the data selection, then depict the selection of reviews and preprocessing, finally describe the definition of variable.

Fig. 1. Research process

1. Data Source Selection: Trip Advisor is an American travel website, the largest travel website in the world with over 3.15 members and more than 46.5 billion entries of hotels, restaurants, and travel scenic spots, as well as other related travel store comments and reviews. The survey by [7] shows that among the hotel review websites most frequently searched by consumers, Trip Advisor website has the highest ranking.

2. Number of Reviews Selected: Targeting hotel reviews on Trip Advisor, this study adopted the top travel scenic spots in North American regions as the data sources. Therefore, in this paper, the top 30 hotel reviews will select, and the total reviews for each hotel totaled about 800 to 1500 entries. About 1/10 of the total reviews was selected for each hotel, accounting for approximately 80 entries. Hence, the reviews for each region were about just over 2400 entries of review information.

3. Data Preprocessing: Repeated reviews, and review ratings with null values will delete. Reviews or message senders without receiving any likes will directly set zero. Table 2 shows the data after compiling the ten data sets.

Table 2. The top 10 most popular North American hotel reviews after arranging

Rank	City	Deleted entries	Data volume	Messages volume
1	New York City	6	2,383	2,364
2	Houston	5	2,381	2,372
3	Los Angeles	6	2,394	2,372
4	San Antonio	19	2,382	2,363
5	San Diego	22	2,779	2,761
6	Orlando	14	2,386	2,368
7	San Francisco	10	2,391	2,373
8	New Orleans	11	2,390	2,378
9	Miami Beach	5	2,396	2,354
10	Las Vegas	10	2,393	2,381

4. The Definition of Variable: Fig. 2 shows the column explored in this study includes hotel ranking, review rating, review helpfulness, etc.
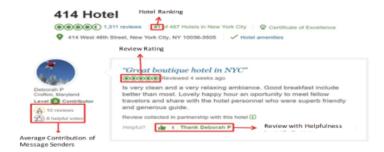

Fig. 2. Review field of TripAdvisor correspond to the variable

(1). Hotel Ranking: According to the hotel popularity ranking algorithm provided by Trip Advisor official website, unlike other websites that rank hotels by price or hotel rating, Trip Advisor adopts message senders' rating as the hotel quality indicator. The quantity of reviewed hotels indicates travelers' comments and hotel information volume; the review newness indicates the newer a review the more it represents the hotel's actual recent situation, which is helpful for consumers. In view of the above-mentioned message sender rating, quantity of reviewed hotels, and review newness, the three items are popularity-ranking indicators that determine overall traveler satisfaction.

(2). Review Rating: This study deems that ratings can enable consumers to quick read product information from an overload of Internet review information. Rating and helpful reviews is related, as shown in Fig. 2. Review ratings designed beside reviews. While reading reviews, consumers can also quickly browse message senders' attitude towards a hotel. Review ratings represented by *s(r)*.

(3). Rating Differences: In this study, rating differences regarded to be influential to hotel owners. The rating difference of a particular review is the difference among all reviews after the review had published. In other words, the higher the rating

difference, the greater the rating difference, the greater the rating difference between the particular review and a subsequent review. As far as hotel owners are concerned, that particular article is crucial; as it is the review that has a major impact on hotel owners. The rating difference formula defined as following.

$$\frac{\sum_{r_2 \in R, r_1 \ll r_2} s(r_2)}{|\{r_2 | r_2 \in R, r_1 \ll r_2|} - s(r_1) \tag{1}$$

R: Review database; $r_1 \ll r_2$: the posting time of r_2 is after r_1

(4). Reviews with Helpfulness: This study deems that the "click like" indicator design for review websites to be intended to lead consumers into believing a particular review possesses helpfulness. After consumers' finish reading the review, they click "like" to show they find the review to be helpful. Review helpfulness and rating differences underwent relevant testing to test if the helpful reviews affected hotels.

(5.) Average Contribution of Message Senders: This study considers the total number of reviews of message senders as their degree of contribution. The average degree of contribution of the message sender represents the number of "like" clicks on each article of the message sender. The number of "like clicks" of the message sender divided by the message sender's total number of reviews to obtain the message sender's average contribution.

4   Statistical Analysis and Result

In this study, SPSS 20 statistical software employed to carry out correlation analysis. Based on the review ratings, the reviews were divided three parts: positive, neutral, and negative. Positive divided into four parts; neutral divided into three parts; negative is divided into two parts. Since the 1–5 rating limited by the system design, rating differences cannot reflect the impact on hotel owners, and thus excluded from the test. The review attributes were first tested. If a review possessed helpfulness, the message sender's attributes then examined, such as the correlation between the message sender's average contribution and rating difference. Whether or not the review and message sender attributes produced impacts on hotel owners examined.

1. According to Table 3(a), among the positive reviews, New York City, San Antonio, San Diego, San Francisco, New Orleans had significantly correlated relationships. Since the top 30 hotels in rank will selected from each region, the positive reviews were approximately five times more than the neutral reviews. On the other hand, the negative review entries were fewer than the neutral reviews, and thus excluded from the test. The results show that the positive review ratings showed a significantly positive correlation with rating difference in five regions. The neutral review ratings in the same region showed the same effect.

Table 3. Review helpfulness and rating differences correlated analysis

	(a) Positive Review				(b) Neutral Review		

ID	Dataset	Pearson correlation coefficient	Significant (two tail)
1	New York City	.183**	0
2	Houston	0.031	0.833
3	Los Angeles	0.255	0.174
4	San Antonio	.180*	0.033
5	San Diego	.204*	0.03
6	Orlando	0.012	0.951
7	San Francisco	.367*	0.036
8	New Orleans	.256**	0.003
9	Miami Beach	0.048	0.588
10	Las Vegas	0.113	0.511

ID	Dataset	Pearson correlation coefficient	Significant (two tail)
1	New York City	0.179	0.465
2	Houston	-0.467	0.204
4	San Antonio	0.183	0.286
6	Orlando	-0.046	0.992
7	San Francisco	.485**	0.003
8	New Orleans	0.185	0.287
9	Miami Beach	-0.157	0.243
10	Las Vegas	0	1

2. Correlated Testing of the Average Contribution of the Message Sender and the Rating Difference: According to Table 4(a–c), the positive reviews in three regions produced a significantly positive correlation. The neutral reviews in one region produced a significantly positive correlation; and two regions produced a significantly negative correlation. For the negative reviews, three regions produced a significantly negative correlation. That is, among positive reviews, the review has an influence as far as hotel owners are concerned. In negative reviews, other reviews following the said review also tend to lead to a negative hotel review.

Table 4. Average contribution of the message sender and the rating difference correlated analysis

	(a) Positive Review			(b) Neutral Review			(c) Negative Review		

ID	Dataset	Pearson correlation coefficient	Significant (two tail)
1	New York City	.144*	0.022
2	Houston	-0.045	0.452
3	Los Angeles	0.01	0.846
4	San Antonio	0.05	0.73
5	San Diego	-0.044	0.366
6	Orlando	0.115	0.334
7	San Francisco	0.011	0.823
8	New Orleans	.240**	0.005
9	Miami Beach	0.006	0.919
10	Las Vegas	.100*	0.042

ID	Dataset	Pearson correlation coefficient	Significant (two tail)
1	New York City	0.283	0.062
2	Houston	-0.085	0.464
3	Los Angeles	0.196	0.081
4	San Antonio	0.134	0.572
5	San Diego	0.033	0.677
6	Orlando	.677*	0.045
7	San Francisco	0.032	0.772
8	New Orleans	-.294*	0.004
9	Miami Beach	-0.005	0.96
10	Las Vegas	.191*	0.039

ID	Dataset	Pearson correlation coefficient	Significant (two tail)
1	New York City	-0.138	0.625
2	Houston	0.1	0.667
3	Los Angeles	-.734*	0.038
4	San Antonio	0.163	0.633
5	San Diego	0.109	0.722
6	Orlando	-.894*	0.016
7	San Francisco	0.289	0.097
8	New Orleans	-.319*	0.047
9	Miami Beach	-0.225	0.147
10	Las Vegas	-0.18	0.249

3. Correlated Testing of Helpfulness and Review Ratings: Table 5 shows that New York City, San Antonio, New Orleans, and Miami Beach regions showed a significantly negative correlation.

Table 5. Review helpfulness and review ratings correlated analysis

ID	Dataset	Pearson correlation coefficient	Significant (two tail)
1	New York City	−.212**	0
2	Houston	0.245	0.132
3	Los Angeles	0.04	0.688
4	San Antonio	−.182**	0
5	San Diego	0.002	0.969
6	Orlando	−0.09	0.324
7	San Francisco	−0.017	0.67
8	New Orleans	−.210**	0
9	Miami Beach	−.278**	0
10	Las Vegas	0.127	0.133

Table 6. Hotel ranking and hotel rating standard deviation correlated analysis

ID	Dataset	Pearson correlation coefficient	Significant (two tail)
1	New York City	.590**	0.001
2	Houston	.498**	0.005
3	Los Angeles	.509**	0.004
4	San Antonio	.604**	0
5	San Diego	.603**	0
6	Orlando	.596**	0.001
7	San Francisco	.494**	0.006
8	New Orleans	.490**	0.006
9	Miami Beach	0.079	0.68
10	Las Vegas	.499**	0.005

4. Correlated Testing of hotel ranking and Hotel Rating Standard Deviation: According to Table 6, nine regions are positive correlation.

Finally, this study further analyzed the correlation between rating and other variables. Reviews with helpfulness and review rating show a negative correlation, with four regions having a significant correlation, namely, New York City, San Antonio, New Orleans, and Miami Beach. As for the correlation between hotel rating and hotel ranking, it was found that hotel rating standard deviation and hotel ranking had a positive correlation, with nine significant regions. It means the farther back the hotel ranking, the greater the rating standard deviation and the more inconsistent the message senders' opinions. Table 7 shows the table of research test results.

Table 7. Research test results list

Testing result of variable correlation	No. of significant area
Review helpfulness and rating differences is positive correlated	6
Average contribution of the message sender and the rating difference is correlated (5 Positive, 4 Negative)	9
Review helpfulness and review ratings is negative correlated	4
Hotel ranking and hotel rating standard deviation is positive correlated	9
Hotel ranking and hotel positive and negative change frequency is positive correlated	8

5   Conclusion and Future Research

The study finding shows review "helpfulness" in positive and neutral reviews have an influence on hotel owners, while the message sender's "average contribution", whether in positive, neutral, or negative reviews, produce a significant relationship. It means

higher message sender's average contribution leads to a positive and high hotel rating following a positive review; in a negative review scenario, consumers also give the hotel a negative review. Moreover, "helpfulness review" and "rating review" have a negative correlation, indicating the lower the review rating, the higher the review helpfulness. Furthermore, hotel rating standard deviation and hotel positive and negative change frequency can used to evaluate hotel ranking. The higher the hotel rating standard deviation and hotel positive and negative change frequency, the more inconsistent the hotel rating and the more unstable the hotel quality.

In the future hotels with lower rankings or hotels with lower total rankings may targeted to carry out relevant research. Extended discussions on reviews for other types of products, such as books, brands, electronic appliances, and cosmetics, may be included. This study recommends that in addition to considering review ratings, emotional characteristics as evaluation factors may also be included. Finally, this study suggests that the message sender's past experiences be included as a consideration.

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