Information Revelation and Social Learning

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Abstract

Most often information provided by sellers or companies is limited. Facing limited information, consumers are turning their attention to social media for more information when making decisions. People read reviews and ratings of products and learn from others' experience. Businesses have started to use social media as a powerful communication tool. This study investigates how reviewers reveal information through social media. The findings show information asymmetry exists in market. Online ratings and evaluations on user generated content websites functions as a supplementary source of product and service information, and moderates the information discrepancy between consumers and companies. This study also finds that business reputation is significantly affected by customer satisfaction. In addition, a new design of reputation ranking system, which is parsimonious and has high degree of consistency, is suggested for existing online rating platforms to consider the adoption.

Key Words: trust; word-of-mouth; online community; social media

1. Introduction

Have you ever bought a product online that was different from descriptions or photos provided by sellers? Have you ever lodged at a hotel that looked nothing like what you expected based on what you read from the hotel website? More recently, a collection of "photo fake-outs "have been released on Oyster.com (Zeveloff, 2013). Those photos show how fantasies can be different from reality. Riverview rooms pictured on some hotel website could actually be concrete buildings-view rooms in reality. Beautiful skyline pools can be quite tiny revealed in the real-life photos. Hotels are "brushing up" the room photos before posting online. We see companies or sellers release information strategically to attract more consumers. Certain information may be purposely hidden from potential buyers. For instance, on eBay, some sellers may choose not to reveal the place of production because consumers may have concerns on the origin of production. In e-commerce, the challenges that consumers face are not only the uncertainties often quality of products and the identities of transaction partners, but also the accuracy of information.

Good decisions are inherently based on sufficient information of high quality. Misrepresented information leads to biased decisions. Facing limited or distorted descriptions of products or services provided by sellers online, consumers are turning to social media for more information before making online transactions.

People read ratings, feedbacks, and comments posted online by other customers. For instance, on Trip Advisor, travellers can check the ratings and popularity index of hotels. They can also read reviews and comments left by hotel lodgers and get more detailed information. Some travellers may also check real life photos posted and tagged by other people on Flickr, instead of simply trusting photos posted on the hotel websites. On Amazon.com or Epinion.com, consumers can post their evaluations of products or services. On eBay, buyers and sellers rate past transactions by leaving positive or negative feedbacks.

People make better decisions based on the crowd of wisdom. The evaluations, ratings, and feedbacks provided by others can be informative. For instance, if a person thinks of buying a tablet, among all options (e.g., Apple iPad Air, Samsung Galaxy Note), he or she prefers the model that is comfortable to hold with one hand. Rarely such information can be found on the official websites of companies who sell tablets. However, consumer reviews on social media provide a good source of such information. By reading online reviews and other users' feedbacks and comments, people make informed decisions on whether the product or service really fits their needs and whether the product or service is close to what they expect.

People benefit from others' experiences by reading online reviews. For instance, the reputation score of a seller gives potential buyers a good idea how trustworthy the seller is; some feedbacks may mention how fast the seller generally ships products so the buyer can adjust his or her expectation, which eventually leads to better transaction experience. In general, people perceive reviews in online communities more trustworthy than information simply listed by sellers or companies. Relying on the information solely provided by sellers or service providers may result in biased decision outcomes. Information can be selectively released or even misrepresented by companies to attract more consumers. Online evaluations, especially reviewed by ones who are influential in online community, can guide readers in the purchase decision making processes. People value informative reviews online.

Information, such as online reviews or feedbacks posted by other consumers, helps reduce information asymmetry, encourage cooperation, improve efficiency of online markets, and build trust in e-commerce. The more information a decision maker has, the better decision she can make.

Nowadays, companies are using social media to reach out to customers. Companies use social media as an essential communication or marketing tool. For example, companies promote brands or new products on Facebook; companies use social media to launch marketing campaigns, to grow their businesses and market shares. Consumers exchange their information and interests on social media. With social media as an interface, companies can email their target audience promotions and reach their fans in minutes. Customers also share their shopping experience on social media. Companies use social media to address problems or issues. To stay competitive, companies need to engage and address the complaints from consumers. Social media tweets or comments can cloud the world of any business, especially when the negative perspective of business dominates. Social media is a powerful and efficient tool that allows businesses to address issues or complaints immediately. The report of customer experience shows that 50% of the customers give businesses one week to respond to the problems (RightNow, 2001). There are potential risks of losing customers when a business ignores complaints. With social media, a business can better align themselves with their customers' values and have better understanding of customers' behaviours and needs. Businesses can improve their service or products by listening to consumers on from social media. Furthermore, businesses can monitor the trends of sales and create ideas of new innovation.

The reputation of a company can be built additionally through social media. A good reputation gives companies advantages. Studies have shown that trust has a positive impact on online purchases, IT adoption, and long term commitment (e.g., Balasubramanian et al. 2003, Cialdini et al., 1991, 2006; Cialdini and Goldstein, 2004, Ye et al. 2011.)Companies are trying to bond with consumers and build a solid reputation on social media. Reputation on social media can affect search results as well.

In this study, we examine how businesses can build a reputation on social media. To the best knowledge of authors, few studies have examined reputation/trust on social media. This work studies if online reviews have an effect on the reputation of a business and how a business ensures trust and gains reputation using the information on social media. Second, we investigate if information asymmetry exists in the market and if the crowd of wisdom provides additional value to consumers. Third, we investigate whether the antecedents of trust, that is, capability, benevolence, and integrity, are relevant factors when consumers evaluate a business on social media. We use hotel data downloaded from TripAdvisor to examine the significance of reputation/trust antecedents on social media.

The paper is organized as follows. In Section 2, we give a literature review and papers on online ratings and reputation/trust are surveyed. In Section 3, we provide the detailed information on data collection and research design. We propose several hypotheses based on the literature of trust and reputation. In Section 4, we test the hypotheses and describe the findings. The last Section 5 concludes our paper and proposes some possible future studies.

2. Literature Review

Research has shown that trust explains customer satisfaction, intention of online shopping, and price premium. For online purchase, Ye et al. (2011) demonstrate that good ratings improve online sales directly, and in hotel industry, managers should address online reputation challenges on social media.

Studies (e.g. Cialdini et al. 1991, 2006;Cialdini and Goldstein, 2004) show that popularity information of products or services influences consumer's purchase behaviours significantly. Balasubramanian et al.(2003) study how customer satisfaction in online services is explained by trust.

The study by Resnick et al. (2006) compares selling results of identities with different reputation records, and shows that sellers with established identity on eBay enjoy 8.4% price premium comparing to who have new identities. It also tests the effect of negative feedback and concludes that in general negative ones hurt sellers but one or two negative feedbacks for new sellers do not affect buyers' willingness-to-pay. The product used in this study is matched pairs of vintage postcards. Standifird (2001) finds that, on eBay, negative feedbacks have more influential and detrimental effect on final bid price than positive ratings. Specifically, one negative feedback cost more than 1% in closing bid price and three or more cost approximately 3.4% final bid price. For positive feedbacks, ten or more can increase the closing price approximately 3.4%. It concludes that negative ratings are more influential. Also, Ba and Pavlou (2002) theorize that feedbacks lead to trust in seller. Trust explains price premium a seller receives. The work by Traupman and Wilensky(2005) mentioned that, in the peer-to-peer network such as eBay, a reputation algorithm can be used to analyze feedbacks to predict the probability that an unknown seller will act trustworthily in a transaction. The algorithm can eliminate unfair feedbacks, such as retaliatory negative feedback.

Urban (2003) finds that companies should adopt the trust-based marketing strategy instead of old-style push-based marketing, because customers become more intelligent and informed. Seven strategies can be used to build trust, which include to strive for transparency, improve product quality, help customers help themselves, realign on the customers' side, put customers to work, create a trust-based supply chain, compare products with those of competitors, and transcend trust in all functions of firm. However, whether to use trust-based marketing strategy depends on the competitiveness of market and characteristics of product and consumer base.

Another branch of studies closely related to this work is research on trust and word of mouth (WOM). Abdul-Rahman et al. (2000) propose a trust system that is grounded on real-world social trust characteristics and word of mouth. The model allows agents to decide which other agents' opinions they trust more and allows agents to progressively tune their understanding of another agent's subjective recommendations. In the model, each agent has a database to represent a global knowledge about the whole network. They propose that the trust concept can be divided into direct and recommender trust. In the research work by Shardanand and Maes (1995), a social information filtering technique, Ringo, is proposed to automate word-of-mouth and provide personalized recommendation on music. The recommendation is based on the values assigned by other users who share the similar taste. It compares interests of users and uses the correlation between values of users to recommend items to the potential user. The test result shows that as the number of users increases the accuracy of recommendation is better. Stewart (2003) shows that trust on web sites is influenced and transferred by hypertext links of trusted websites based on the interaction and similarity of the linked organizations. Specifically, Stewart thinks that the greater the perceived relatedness or perceived tie between an unknown target and a trusted target, the higher the initial trusting beliefs about the unknown target. The impact of any link received decreases as the number of links sent by a particular linker to different linkers increases. Furthermore, it shows that trust beliefs of linked web have positive effect on purchase intention.

Awad and Ragowsky (2008) study the effect of trust on intention of online shopping, in which gender is a control variable. Several findings are interesting. At first, men's willingness of posting their opinion is positively correlated with WOM quality, while women's is negatively related. Secondly, responsive participation by others is positively correlated with WOM quality and affects women's perception more than men's. Thirdly, WOM quality has positive effect on online trust and the effect is more significant in magnitude for men than women. Perceived Ease of Use (PEOU) has significantly positive effect on trust for men than women, though Perceived Usefulness (PU) has positive effect on trust for both men and women and somewhat more for women. Finally, the online trust is positively related with intention to shop online and is more significant for women than men.

Research on online ratings is relevant to this work. Dellarocas (2003) surveys current studies of online reputation dynamics in game theory and economics fields, and find out that for the scale measures used by reputation management, the number of scales does matter. Dellarocas (2005) shows that reputation mechanisms induce current cooperation using the threat of future punishment that equals to the opportunity cost of foregone future profits when a seller's profile turns bad and get expelled from the market.

Secondly, he concludes that fewer ratings in the seller's profile do not affect the maximum efficiency of reputation mechanism and in fact broaden the range of settings where cooperation can be induced.

Thirdly, eBay-like reputation mechanism can induce the maximum possible efficiency if types of players are known. Traders can maximize payoffs with strategies that a seller's anticipated probability of cooperation is negatively related with the number of negative ratings. Also, eBay-like mechanism can attain high seller payoffs in the presence of free identity changes, so efficiency losses are inevitable and the author suggests an entrance fee solution. Finally, it is shown that the format of reports (binary ratings, multiple types, text, etc.) induce some degree of cooperation. About missing feedbacks, the authors states that the most efficient policy is to treat them as positive feedbacks.

There are also some works on how to design rating systems.

Dellarocas (2006) finds that the reputation reporting system achieves the economic efficiency if the sellers' optimal strategy is to advertise the product's expected quality as the true quality and the seller settles with the optimal strategy. Based on the assumption that buyers are lenient when rating the seller but strict when assessing the seller's reputation, the binary feedback reporting system is able to provide efficiency. However, it is difficult to derive the right judgment rule about the right number of negative ratings beyond which the seller is untrustworthy because the available information is limited. His following work proposes several approaches to exclude unfair ratings in reputation system, which include mean filtering, frequency filtering, and controlled anonymity approaches. Also, he gives an overview of design challenges of current reputation reporting systems, such as subjectively measurable attributes and intentionally false opinions.

In the study by Wasko and Faraj (2005), the authors study the knowledge sharing in e-community and find that people contribute their knowledge without the expectation of reciprocity if sharing can improve their reputation in the network or when people have experience to share or are embedded in the network. The results indicate that it is important to develop a group of key active participants for sustaining the network.

These studies have investigated many aspects of trust and reputation, but none of them investigates how business can build reputation or trust using the crowd of wisdom. Few of studies consider trust on social media. The contributions of this work are the findings of how reputation on social media is determined, of how reputation on social media is different from reputation viewed by peers in industry, and of the antecedents of customer satisfaction in online community.

3. Research Design

We consider several aspects of reputation and trust on social media. First, we studyif reputation of business is affected by online customer reviews. Higher reputation generates more potential sales. We examine how reputation of business is related to customers' satisfaction. Second, we want to study whether contents on social media show any information asymmetry existed in market. Third, we determine if existing ranking systems can provide a good index of reputation.

3.1 Sample Data

According to U.S. Travel Association, "Nearly 79 percent of the 135 million online travellers, equating to 105 million U.S. adults, used the Internet to plan their trips during the past 12 months."(Travelers' Use of the Internet, 2009) Many websites such as TripAdvisor, Hitwise, and Oyster.com provide platforms for travellers to exchange information and make recommendations. Most travellers like to have as much information available as possible.
Among all these websites, Trip Advisor is the largest online travel community in the world (TripAdvisor Fact Sheet, 2013). It has over 260 million unique reviewers, and more than 100 million reviews. The reviews cover hotels, attractions, and restaurants over 30 countries. It becomes a powerful interface for travellers to find related information while planning their trips.

We write Java code and download the numerical ratings from Trip Advisor. There are 105,069 reviews from 1642 hotels worldwide in the data. There are six different types of numerical ratings downloaded, include overall rating, value rating, location rating, clean rating, room rating, and service rating. Each reviewer rates hotels on their location, cleanness, room, service, and value. The overall rating is the rating that a reviewer gives to a hotel in terms of its overall service and facilities. Rating scale is from one to five. The bigger rating number means that a customer is more satisfied with the service and/or facility of a hotel.

In addition to numeric ratings and review texts left by reviewers, information such as popularity index of hotels, average year-round price, the number of reviews for each hotel, is also provided on the TripAdvisor website.

The popularity index shows how popular a hotel is. The average year around price is the mean of prices throughout the year listed on TripAdvisor by a hotel. The number of reviews shows how many reviews each hotel got per year.

Besides of numeric ratings, the code crawls the TripAdvisor website and downloads text reviews of hotels as well. People write their experience in these reviews. The reviews can be anything about hotels, such as smoking smell, the size of swimming pool, the cleanness of rooms, the atmosphere of dining area, the courtesy of staff, etc. There are reviewers who give ratings without writing words, but most reviewers leave the ratings of hotels and write reviews. Some reviewers submit their feedbacks multiple times, which generate duplicated reviews in the downloaded data. The duplicated reviews are identified from the same reviewer and are removed.

Only there views with text comments are reserved for this analysis. If a reviewer only gives ratings without leaving any text reviews, those reviews are discarded accordingly. On average, there are over four hundred reviews for each hotel, so the deletion of reviews without text comments has limited impact on the sample size. The basic statistics of downloaded is provided in the following Table 1.

Table 1: Summary of Hotel Reviews

	Number of reviews	Avg. Year-Round Price	Overall Rating	N Obs
Max	2686	$997	5	
Min	13	$30	1	105059
Avg	364.5	$277.60	4	

Also, we select a number of hotels and add critics' hotel star for each of these hotels manually. The critics' hotel star with star classification system is the hotel's star level with star classification system. The selected hotels are located in Las Vegas, Nevada. Las Vegas is well known internationally as a resort city. We select the hotels from the same city to avoid biased ratings, because U.S. studies show that people tend to give different ratings for the same hotel chain located in different cities.

There are 55 hotels selected in total in this study. The selected hotels include 5 star hotels such as Four Seasons Hotel Las Vegas, Signature at MGM Grand, Wynn Las Vegas, etc.; 4 star hotels as Treasure Island, Renaissance Las Vegas Hotel, and Mirage Hotel & Casino; 3 star hotels like Wingate by Wyndham Henderson, and Bill's Gambling Hall & Saloon; 2 star hotels such as Holiday Inn Express Las Vegas South, Palace Station, and Hampton Inn Tropicana; 1 star hotels as Golden Gate Hotel & Casino,Comfort Inn, Motel 6 Las Vegas Tropicana, Super 8 Las Vegas, etc. The majority of selected hotels are 3 star and 2 star hotels. There are fourteen 3 star, eighteen 2 star hotels, eight 1 star hotels, six 5 star, and nine 4 star hotels. The descriptive statistics of the selected hotels data is summarized in the following table.

Table 2: Summary of Selected Hotel Samples

Hotel Star		TripAdvisor Rating	Number of reviews	Popularity Index	Avg. Year-Round Price	Overall Rating
5	Max	4.50	2818	14	$1,312.00	4.73
	Min	4.00	61	1	$183.00	1.73
	Avg	4.33	1170	6	$432.83	4.11
4	Max	4.50	2865	124	$202.00	4.61
	Min	3.00	242	6	$104.00	3.17
	Avg	3.93	1049	46	$169.33	3.99
3	Max	4.50	1320	147	$446.00	4.67
	Min	3.00	30	4	$68.00	2.62
	Avg	3.96	482	49	$122.79	3.94
2	Max	4.00	407	155	$119.00	4.28
	Min	2.50	18	27	$52.00	2.61
	Avg	3.56	106	98	$87.61	3.50
1	Max	4.00	246	160	$95.00	3.85
	Min	3.00	44	64	$37.00	2.50
	Avg	3.44	97	124	$63.13	3.24

For the selected hotels, the average number of reviewers for a hotel is 472, the average year-round price is $144, and the average of overall rating is 3.72. Interestingly, people are conservative when giving superior ratings. The highest rating value observed is 4.5, even to 5 star hotels such as Skylofts at MGM Grand. Also, we observe that people tend to soften their ratings in some cases.

Most people give ratings such as 3 or 3.5 to 1 star hotels. With the selected data set, the lowest rating value observed is 2.5 and the online rating values are in the range of 2.5 and 4.5.The average rating value is 3.72.We provide boxplots for overall ratings and popularity index by critics' stars. As shown in Figure 1, 5 star hotels have higher overall ratings. Interestingly, we observe that 4 star hotels do not necessarily have higher overall rating values than 3 star hotels. Figure 2 shows the popularity index of hotels have similar trends.5 star hotels are on the top of popularity index list. 4 star hotels again are not more popular than 3 star hotels. To win a title, 4 star hotels "get stuck" in the middle. 4 star hotels have problems of exceeding 3 star hotels on social media in terms of popularity and overall rating.5 star hotels have excellent reputation in general. The popularity index of 1 star hotels falls behind other hotels.

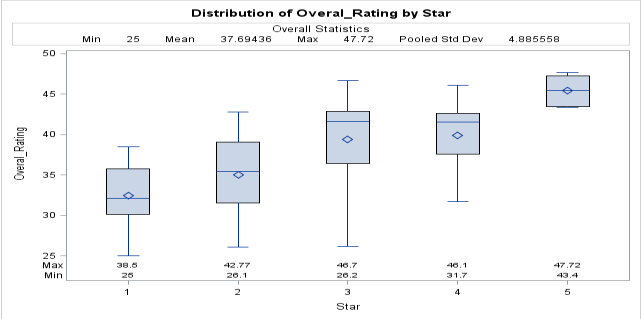

Figure 1: Box Plot of Overall Rating by Stars

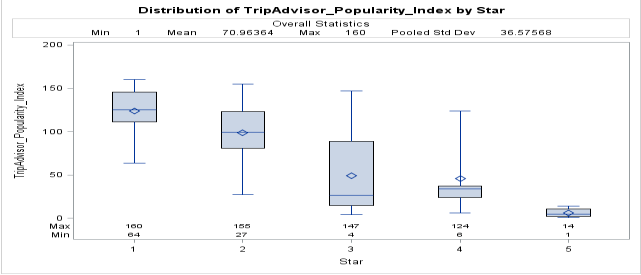

Figure 2: Box Plot of Popularity Index by Star

3.2 Hypotheses

The popularity of hotel can stand for the prestige or prominence of hotel. The popularity index of hotels is provided on Tripadvisor.com. The smaller popularity index number of hotel represents that the hotel is more popular. So, we choose the popularity of hotel as the proxy of reputation. Therefore, we form a hypothesis as below. Hotels have strong incentives to stay on the top of popularity index list. The more popular a hotel is, the more consumers the hotel can attract, and hence more sales can be generated. The reputation is built upon "word-of-mouth", which is based on customer satisfaction. Overall ratings, room ratings, or clean ratings, show how much customers satisfy service or product quality. We use online ratings to represent customer satisfaction. Therefore, we conjecture the following hypothesis.

Hypothesis 1: Reputation is positively associated with customer satisfaction.

In many cases, we observe information asymmetry. What companies present on their website can be different from reality. For instance, in hotel industry, to attract more customers, hotels use "brushed photos" on their website. Information provided on company official websites can be incomplete or misleading.

The consumers' online ratings show the reality. We know that consumers evaluate product or services based on their real experience. The evaluations are their perception what they pay for. In many industries, there are expert ratings which provide guidance or support information for consumers. For instance, in automobile industry, expert critics are based on safety, technical features behind the wheel safety, price, fuel efficiency, etc. In hotel industry, the critics' star system shows how experts rate hotels. Critic stars are in a range of one to five. 5 star hotel rooms must be complete with stylish furnishing and high quality linens. Jacuzzis, hot tubs, CD stereos, VCR's and more are included.

5 star hotels also have sumptuous lobbies, valet or/and garage parking, fitness rooms, up to three restaurants, etc. Service is available 24 hours a day. Concierge is a must as well. 4 star hotels are less well furnished and room service is available most of time but not 24 hours, and so on.

We conjecture that review ratings by consumers are significantly different from critic stars. Therefore, we hypothesize:

Hypothesis 2: The average online overall rating is different from critics star.

As mentioned above, the numeric ratings downloaded from TripAdvisor include overall rating, cleanness rating, location rating, value rating, room rating, and service rating. Overall rating show how travellers evaluate a hotel overall. The higher number the overall rating is, the better service level is perceived. It represents the standards of hotels. It stands for the overall customer satisfaction.

The cleanness of hotel is one of the major concerns when people book hotels. Clean rating shows how travellers evaluate the cleanness of rooms, including bathrooms, bedrooms, working desk, etc. Location rating is about how convenient a hotel is located, for instance, easy access to restaurants, shopping areas, or tourist spots. Value rating indicates how travellers think if their lodging experience worth the amount of money they spent on hotel stays. Room rating explains how travellers view hotel rooms. Service rating describes the travellers' perception of service quality. The capability and benevolence of hotels can be measured by cleanness rating, service rating, and room rating. Studies on trust and reputation show that capability and benevolence are antecedents of trust. Therefore overall rating (customer satisfaction) should be closely related with cleanness rating, service rating, and room rating (capability and benevolence).

In addition, the Expectancy Disconfirmation model mentioned in the study (Barsky 1992) suggests customer satisfaction (overall rating) is affected by consumer's expectancy and perception value. The difference of expectancy and perception value can be measured by value rating, since value rating indicates whether travellers' expectation on hotel is met during their stays at some level. It is necessary to point out that, when people give room ratings, they rate hotel rooms in all aspects, including the cleanness. Thus, room rating must be highly correlated with clean rating. Furthermore, the cleanness shows the service quality too. It is very likely that all these factors, clean rating, service rating, and room rating, are highly correlated.

We surmise that overall rating is positively correlated with room rating, location rating, and value rating. The effect of service rating and cleanness rating can be explained by room rating. Therefore, we conjecture the following hypothesis.

Hypothesis 3: The overall rating is positively correlated to value rating, rooms rating, and location rating.
The above hypotheses are tested with our hotel data. The test findings and the summary of analysis results are provided in the next section.

4. Findings

The Statistical Package, SAS, version 9.2, is used for data analysis. ANOVA tests and Regression analysis are performed to determine the significance of factors with various variables. Tukey test is used when comparing if there is any significant difference between group means. The diagnostic plots are also drawn to illustrate the relationship between variables. The RSTUDENT residuals are plotted to show if there are any outliers and how variable of the residuals are. The normal-probability Q-Q plot checks if the assumption of normality of residuals is valid.

The data are the selected hotels in Las Vegas, Nevada, USA. Hypothesis 1 examines how to maintain good reputation. Table 3 demonstrates that reputation (the popularity index of a hotel) is significantly correlated to consumer satisfaction (overall rating). We also test the significance of hotel rates. The findings show that price is not a relevant factor, with 95% confidence level.

Table 3: Model of Reputation on Customer Satisfaction

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr> F
Model	2	121774	60887	173.01	<.0001
Error	52	18300	351.92013		
Corrected Total	54	140074			
Root MSE	18.75953	R-Square	0.8694		
Dependent Mean	70.96364	Adj R-Sq	0.8643		
CoeffVar	26.43542				
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr> |t|
Intercept	1	364.00449	16.62183	21.9	<.0001
Avg. year-round price	1	-0.00593	0.01558	-0.38	0.7052
Overal_Rating	1	-7.75148	0.45518	-17.03	<.0001

In Figure 3, it shows that the normal assumption of the residuals is not violated. The outlier with residual 77.32 is a 1 star motel. The motel rate is $80 on average all year around, which is higher than the average rate, $63,over all 1 star hotels in our data set. The motel's overall rating is 3.778. It is close to the highest overall rating for all 1 star hotels, 3.8. But the popularity index of the motel is #148, which falls far behind the average popularity index of all 1 star hotels #123.

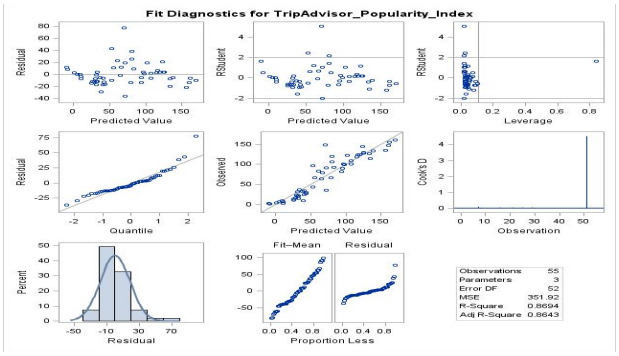

Figure 3: Model of Reputation on Customer Satisfaction

As for the Hypothesis 2, Table 4 shows online overall rating is significantly different from expert star systems. Online reviewers give similar ratings to 5, 4, and 3 star hotels. These rating values vary rarely. There is no significant difference of rating values for 3, 4, and 5 star hotels. The ratings of 2 and 1 star hotels are significantly different from that of 5 star hotels. The lowest traveller rating is 2.5 in the data set for the 2 star hotel Plaza Hotel & Casino at Las Vegas, Nevada. The highest traveller rating is 4.5 for the 5, 4, and 3 star hotels, such as Four Seasons Hotel Las Vegas, Skylots at MGM Grand, Renaissance Las Vegas Hotel, Embassy Suites Las Vegas Airport, etc. In short, when providing ratings, people are lenient with hotels. The majority of hotels share similar ratings. Therefore, the hypothesis 2 is valid (i.e., cannot be rejected).

Table 4: Tukey Test- Critics Stars vs. Ratings

Alpha		0.05		
Error Degrees of Freedom		50		
Error Mean Square		0.210973		
Critical Value of Studentized Range		4.00195		
Comparisons significant at the 0.05 level are indicated by ***.				
Star Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
3-5	0.369	-0.2652	1.0033	
4-5	0.4	-0.285	1.085	
2-5	0.7778	0.1651	1.3905	***
1-5	0.8958	0.1939	1.5978	***
2-3	0.4087	-0.0544	0.8719	
1-3	0.5268	-0.0493	1.1029	
3-4	-0.031	-0.5863	0.5244	
2-4	0.3778	-0.1529	0.9084	
1-4	0.4958	-0.1357	1.1274	
1-2	0.1181	-0.4342	0.6704	
5-1	-0.8958	-1.5978	-0.1939	***

As shown in Table 5 and 6, the hotel overall rating is positively correlated to value rating, room rating, and location rating.

All the determinants are significant at the confidence level of 95%. The R-Square and adjusted R-Square are 0.9618 and 0.9696respectively. The coefficients of value rating, location rating, and service rating are 0.26582, 0.12623, and 0.64493. Therefore, the hypothesis 3 is supported (i.e., cannot be rejected).

Table 5: Overall Rating Model-Analysis of Variance

Number of Observations Read		55			
Number of Observations Used		55			
Source	DF	Sum of Squares	Mean Square	F Value	Pr> F
Model	3	1915.55523	638.51841	428.48	<.0001
Error	51	76.00033	1.4902		
Corrected Total	54	1991.55555			
Root MSE	1.22074	R-Square	0.9618		
Dependent Mean	37.69436	Adj R-Sq	0.9596		
CoeffVar	3.23852				

Table 6: Overall Rating Model-Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr> |t|	Variance Inflation
Intercept	1	-2.15678	1.55316	-1.39	0.171	0
Value Rating	1	0.26582	0.07663	3.47	0.0011	4.70434
Location Rating	1	0.12623	0.03226	3.91	0.0003	1.39124
Rooms Rating	1	0.64493	0.04752	13.57	<.0001	3.99273

We also use SAS to plot Fit Diagnostics. In Figure 4, the normal-probability Q-Q plot shows that the assumption of normality of residuals is valid and reasonable, and the residual plots demonstrate that no outlier is observed.

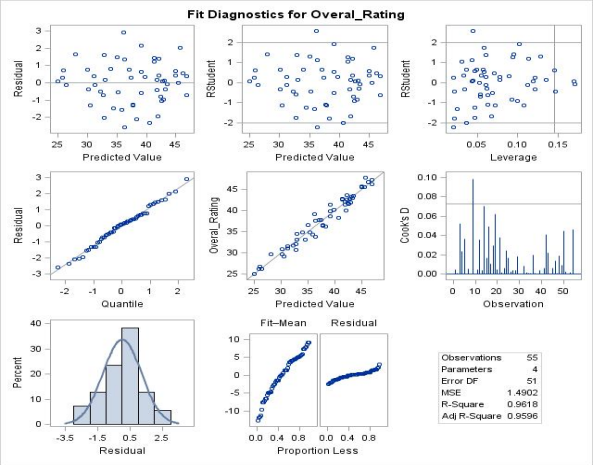

Figure 4: Overall Rating Model-Fit Diagnostics

The results show that hotel overall rating is positively correlated with value rating, room rating, and location rating. As we pointed out previously, we believe clean rating, service rating, and room rating are highly correlated. To investigate the significance of cleanness rating and service rating, we conduct ANOVA analysis on overall rating over all other sub-ratings, which include location rating, clean rating, value rating, rooms rating, and service rating. The findings, as listed in Table 7 and 8, show that the clean rating is not statistically significant to explain the overall rating. The Variance Inflation Factor (VIF) shows the severity of multicollinearity in an ordinary least squares regression analysis. As shown in the Table 8, the VIF values are 22.64, 10.64, and 27.74 for room rating, service rating, and clean rating, respectively. Clean rating, room rating, and service rating are highly correlated.

Table 7: Overall Rating Model-Analysis of Variance

Number of Observations Read			55		
Number of Observations Used			55		
Source	DF	Sum of Squares	Mean Square	F Value	Pr> F
Model	5	1935.86	387.172	340.63	<.0001
Error	49	55.6952	1.13664		
Corrected Total	54	1991.56			
Root MSE	1.06613	R-Square	0.972		
Dependent Mean	37.6944	Adj R-Sq	0.9692		
CoeffVar	2.82836				

Table 8: Model of Overall Rating on All Sub-Ratings

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr> |t|	Variance Inflation
Intercept	1	-3.47	1.42	-2.44	0.02	0.00
Value Rating	1	0.18	0.07	2.48	0.02	5.33
RoomsRating	1	0.52	0.10	5.25	<.0001	22.64
ServiceRating	1	0.36	0.09	4.13	0.00	10.64
Clean Rating	1	-0.08	0.12	-0.70	0.49	27.74
LocationRating	1	0.10	0.03	3.58	0.00	1.45

5. Managerial Implication

Managerial insights from the above analysis are that, there exists information asymmetry in market and the crowd of wisdom provides a supplementary source of information. Online ratings and evaluations show the reality, which can be quite different from fantasy presented by companies on their website. Second, reputation of business is positively related to customer satisfaction. The better online evaluations are, the higher reputation is and more potential sales can be generated.

In addition, to improve customer satisfaction, managers should focus on benevolence and capability (clean, service, and room ratings). We also suggest TripAdvisor or any other online rating websites consider a better design of their rating systems. On TripAdvisor website, the rating system is designed in a way that overall rating measures the rating in all aspects and it uses the subcategories such as room rating, clean rating, location rating, value rating, and service rating. However, the findings show that clean rating, service rating, and room rating are highly correlated with each other. When hotel guests rate rooms, they consider factor such as clean and service. Thus, we suggest TripAdvisor and all other online rating systems consider a better design of rating system. For example, a possible approach is to use the subcategories as room rating, value rating, and location rating instead of including all those five ratings. When designing a rating system, business should consider interdependency, consistency, and completeness of rating factors.

6. Conclusion

Information on social media or social community can be helpful to consumers. When a consumer considers purchasing a product or service, he or she may read online reviews and ratings before making a decision. When business is trying to improve its product or service, it can get good insights from consumers' comments or reviews posted online. Both consumers and business are turning their attention to social media in E-commerce era. This study shows information asymmetry exists in market. The crowd of wisdom provides valuable information for users.

The findings show that reputation is significantly related to customer satisfaction. The travellers' hotel rating data are downloaded from TripAdvisor. In addition to the ratings and reviews of hotels, the popularity index of hotel, price, star level, the number of reviews, and many more are also downloaded from TripAdvisor. With the downloaded data, an empirical study is conducted to investigate how reputation can be built by using the crowd of wisdom online. To remain good or achieve better reputation, business is suggested to focus on the capability and benevolence, which are the antecedents of trust-building. In hotel industry, the capability and benevolence can be represented by service rating, room rating, and clean rating. We also suggest TripAdvisor and all other online rating systems on social communities consider a better design of rating systems.

The current design used by TripAdvisor shows several sub-ratings are highly correlated. We suggest a simplified design should be considered. The factors adopted in rating systems should be relevant, inter-independent, and complete.

In addition, very interestingly, the analysis shows that 4 star hotels have problems of standing out from 3 star hotels on social media. The results show that 5 star hotels have superior overall ratings and popularity index numbers, but 4 star hotels are mixed with 3 star hotels in terms or popularity and the overall rating. Managerial insights are to either exceed or stay on average, for hotel or any other industry. The marginal reputation gain,with excelling the average but still falling short of being super stars, is little.

This work uses the hotel review data downloaded from TripAdvisor and the 55 hotels selected in this study are located in Las Vegas, Nevada, USA. One possible improvement of this work is to include more hotels. Also, we can investigate other industries. For future work, it is possible to download the ratings and reviews of other types of service or products. However, this research does provide plausible framework for similar industries such as airline, car rentals, and restaurants. In addition, it would be interesting to discover and/or monitor any trends or changes from online reviews or ratings.

In conclusion, the study shows how the crowd of wisdom can be used to ensure trust or build reputation through social media by business. To achieve better reputation and stay competitive, business must provide better service and serve and expand more satisfied customers.

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