The Influence of Fake Reviews on Consumer Perceptions of Risks and Purchase Intentions

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Online reviews are powerful; but not all of them are authentic. The current research focuses on what we term as Fake Reviews and proposes a conceptual model to delineate the relationship among Fake Reviews, consumer perceptions of risks, and purchase intentions. We classify Fake Reviews into Useless Reviews (Non-review Content and Advertising Content) and False Reviews (Shameless Promotion and Malicious Slander). Analyzing responses of 245 Chinese consumers, the current research demonstrates the influence of Fake Reviews on consumer perceptions of risks, which in turn affect consumer purchase intentions.

INTRODUCTION

With the advent of the Internet, information and communication technology has penetrated deeply into all aspects of consumer life to remove space and time constraints and create a comfortable, quick, and convenient shopping atmosphere. Reviews on various B2C shopping websites and numerous social networking sites not only provide more information for consumers, but also have emerged as an important reference point for consumers when making purchase decisions. Ranging from making reservations at a hotel or dining at a restaurant, today's consumers typically check opinions or suggestions of other patrons before making their own choices. As online reviews are easily accessible, the purchase decision-making process is inevitably affected by the online product reviews (Lee et al., 2008; Utz et al., 2012). The Internet provides a high degree of openness, which allows all users of the Internet to post comments anonymously, rendering a free space for anyone to create and spread unverified content, as a result. Not

all comments published in the cyberspace are always truthful, yet a lay consumer may not immediately recognize it. Comments can be created by not only the actual users, but also by businesses, shamelessly promoting themselves and viciously slandering contenders (Lucas & Zervas, 2016; Mayzlin et al., 2014). Web publishers with different motivations post different types of fake reviews and comments that can interfere with consumer willingness to buy. Such fake reviews introduces uncertainty in the consumer decision making process. Thus, discerning the credibility of online reviews is a serious concern for not only businesses, but for policymakers as well (Malbon, 2013).

The current research conceptualizes relationships among fake reviews, consumer perceptions of risks and consumer purchase intention, to ultimately construct a framework that explains consumer decision making process impacted by online browsing of fake reviews. The conceptual framework, along with a set of hypotheses, is tested with the data collected from Chinese consumers. The findings of the current research can assist marketers and consumers in discovering helpful and practical tips on how better to manage online websites, whether they are third-party review sites or retailer sites.

CONCEPTUAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Classification of Fake Reviews

In order to promote or undermine the reputation of a product or business, some users deliberately publish unrealistic, untrue, and deceptive comments, to mislead consumers. Fake reviews are referred to as Spam Reviews, Opinion Spam, or Bogus Reviews. Some published reviews are not pertinent to actual products, disrupting correct cognition of the product. Some are incomplete or completely irrelevant, rendering them useless. There have been several attempts in the literature to explore the extent of these reviews and subsequently classify them. One is to use assessment level given by the user (Lim et al., 2010). Another is based on unigram model to improve the recognition accuracy of unreal comments from analyzing the language (Lai et al., 2010). Yet another method uses heterogeneous comment graphs to identify bogus reviewers (Wang et al., 2011). Consistent with these efforts, extant literature has developed several mechanisms for identifying the fake reviews and spam comments. Spatial models are used to identify spam comments in the field of blog (e.g., Bitton, 2009), which may be applicable to the field of online product reviews. Linguistic discrepancy captured by content analyses can be another clue (e.g., Battarai et al., 2009).

Incorporating the extant research and examining closely the content of the fake reviews, the current investigation is based on the following taxonomy. The first category is termed *Useless Reviews*, which are fake reviews completely unrelated to the reviewed product itself. Many in this category comprise of non-review content and ad-embedded content. *Non-review Content* refers to non-comment content that are irrelevant, incomplete or empty. *Advertising Content* refers to ad-embedded comment, that includes technical parameters of a product displayed in comment area in order to promote merchant or shopping website products, or a sales-related statement that is not relevant to the review.

The second category is termed *False Reviews*, referring to the 'truly fake' reviews of the relevant product. Depending on the purpose of the reviews, they can be further categorized into two different types: reviews containing *Shameless Promotion* and *Malicious Slander*. *Shameless Promotion* reviews are duplicated and falsified reviews containing similar content evaluating a specific product, in order to shamelessly promote it. Malicious Slander reviews are false reviews denigrating competitors' brands.

The Influence of Fake Reviews on Perceived Risk

The concept of perceived risk has been long studied in marketing as an influential antecedent to purchase intentions (e.g., Stone & Gronhaug, 1993). Perceived risk is usually defined as the possible adverse consequences and judgment that formed to consumers' own shopping behavior (e.g., Forsythe & Shi, 2003). Of the important dimensions of perceived risk, functional and economic risks are considered (Jacoby & Kaplan, 1972). Additionally, time risk is another crucial dimension of consumer perceptions of risk (Cases, 2002). Quantity and quality of spam comments can have an influence on perceived risk to the

information receiver (Ormond & Warkentin, 2015). The current research investigates how fake reviews can differently influence these three dimensions of perceived risk: functional, economic, and time risks.

Impact of Useless Reviews (Non-review and Advertising Content) on Perceived Risk

When consumers browse *Useless Reviews*, whether they are *Non-review Content* unrelated to the product itself or *Advertising Content* of an unrelated product, consumers do not learn of any features of the reviewed product and thus face increased functional risk. Additionally, facing a large number of such reviews drastically burdens consumers' browsing time, thereby affecting perceived time risk. Even after reading a large number of such *Useless Reviews*, uncertainty of the purchase does not abate, thus increasing economic risks. Consequently, the overall presence of *Useless Reviews* will increase all three dimensions of the perceived risk regarding a particular purchase. Formally stated, the hypotheses are as follows:

H1 : Non-review Content of Useless Reviews will increase consumer perceptions of risk (a: functional risk, b: time risk, and c: economic risk)

H2 : Advertising Content of Useless Reviews will increase consumer perceptions of risk (a: functional risk, b: time risk, and c: economic risk)

Impact of False Reviews (Shameless Promotion and Malicious Slander) on Perceived Risk

Credibility of online reviews has an impact on consumers' perceived risk.[16] As false and untruthful reviews waste consumers' time to view and judge them, perceptions of time risk are affected. Doubting the credibility of False Reviews cannot help consumers understand real details of the product, and this increases functional risk. Especially when *Malicious Slander* reviews appear, consumers may immediately doubt the authenticity of these reviews, thus affecting their perceived risk. If consumers believe that reviews are not trustworthy, perceived uncertainty about the product cannot be diminished, thereby impacting perceptions of functional and economic risks. In this manner, both types of these False Reviews can mislead consumers to make risky purchase decisions. Accordingly, the next set of the hypotheses are as follows:

H3 : Shameless Promotion of False Reviews will increase consumer perceptions of risk (a: functional risk, b: time risk, and c: economic risk).

H4 : Malicious Slander of False Reviews will increase consumer perceptions of risk (a: functional risk, b: time risk, and c: economic risk).

Influence of Perceived Risk on Purchase Intention

Purchase intention is a construct that represents the probability that consumers are willing to take a particular purchase behavior and is an accepted measure that predicts actual purchase behavior in the literature (Morwitz, 2014). Several researchers have confirmed that perceived risk has a significantly negative influence on purchase intention, and thus the next hypothesis is as follows:

H5 : Consumer perceptions of risk (a: functional risk, b: time risk, and c: economic risk) will decrease consumer purchase intention.

The conceptual framework and the hypotheses of the current research is summarized in Figure 1.

FIGURE 1
CONCEPTUAL FRAMEWORK AND HYPOTHESES
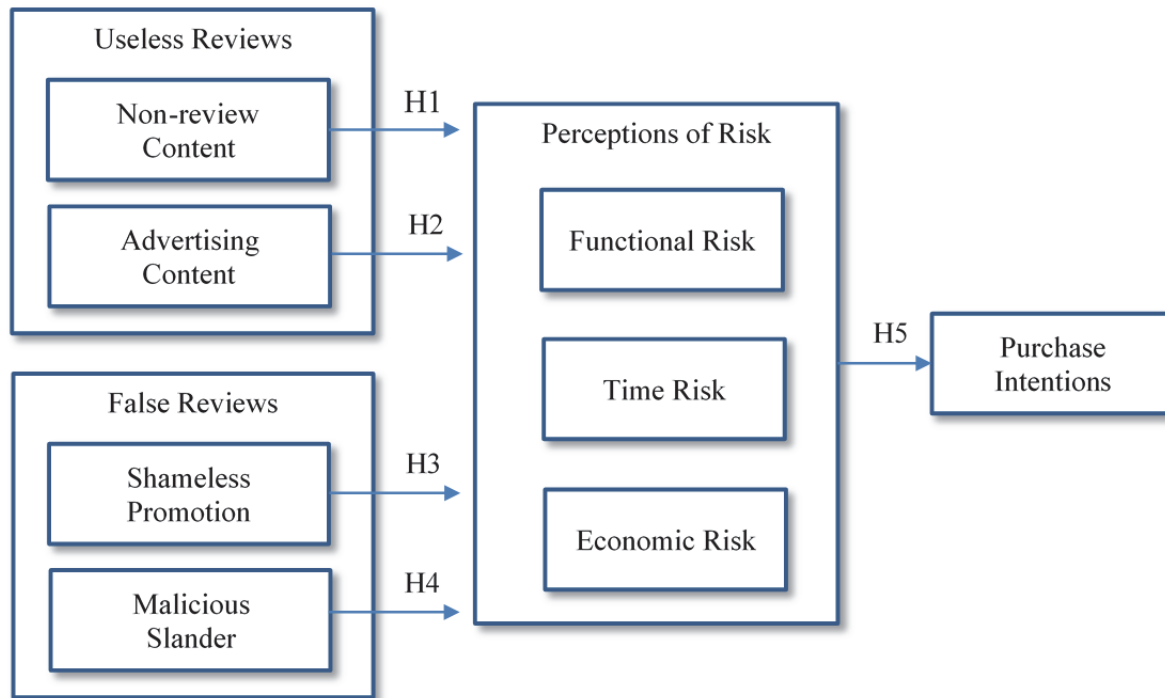
METHODOLOGY

Questionnaire Design

For the context of our survey instrument, the purchase of a T-shirt was selected. In the beginning of the questionnaire, participants were introduced to a scenario of seeing a casual T-shirt to buy on a website. Respondents then browsed several reviews on the shopping website and saw three of the four types of *Fake Reviews*. They were asked to evaluate each of the three reviews in various regards, such as prevalence, similarity, or genuineness of the content. Afterwards, respondents answered questions assessing their subjective feelings about different types of fake reviews on a 5-point scale, particularly pertaining to the three dimensions of perceived risk: time risk, functional risk and economic risk (each dimension was assessed with three questions). Next, they answered five questions pertaining to the willingness to purchase the T-shirt after seeing the reviews. All questions used in the questionnaire are detailed in Table 1. Lastly, everyone answered questions about their demographic characteristics.

TABLE 1
RELIABILITY AND VALIDITY OF THE COLLECTED DATA

Measured Construct		Question	Factor Loading	Values	Explained Variance（%）
Useless Reviews	Non-review Content (α = 0.807）	I often see similar reviews.	0.916	0.500[a] 148.898[b] 0.000[c]	83.868
		I've seen similar reviews repeatedly.	0.916		
	Advertising Content (α = 0.896)	I often see similar reviews.	0.952	0.500[a] 261.133[b] 0.000[c]	90.600
		I've seen similar reviews repeatedly.	0.952		
False Reviews	Shameless Promotion (α = 0.879)	I think the above reviews are exaggerated.	0.871	0.819[a] 524.748[b] 0.000[c]	73.651
		I think the above reviews have intentionally advocated the product.	0.888		
		I think the purpose of the above reviews is strongly urging me to buy.	0.797		
		I think the above reviews are false.	0.874		
	Malicious Slander (α =0.905）	I think the above reviews are exaggerated.	0.880	0.815[a] 646.4[b] 0.000[c]	77.866
		I think the above reviews have intentionally advocated the composition.	0.906		
		I think the above reviews from the store's competitors.	0.861		
		I think the above reviews are false.	0.883		
Perceived Risk	Functional Risk (α = 0.819）	I think the T-shirt may lack quality assurance.	0.912	0.666[a] 314.909[b] 0.000[c]	74.388
		I think the T-shirt may not be as I expected.	0.890		
		I think these online review information is different from the actual T shirt.	0.779		
	Time Risk (α = 0.875）	I worry about browsing similar reviews will waste me a lot of time.	0.881	0.737[a] 395.782[b] 0.000[c]	80.825
		By looking at the online reviews, I worry about spending a long time.	0.916		
		Viewing the reviews of a product that is not right or has problems will cost me time.	0.900		
	Economic Risk (α = 0.839)	Viewing similar online reviews to decide to buy the t-shirt may cause economic losses.	0.858	0.709[a] 306.131[b] 0.000[c]	76.031
		Browsing a similar online review before buying may increase my total cost.	0.904		
		Making decisions from above reviews to buy the T-shirt may cause additional cost losses.	0.854		
Purchase Intention （α = 0.905）		These online reviews help me decide whether to buy this T-shirt.	0.851	0.800[a] 971.249	73.138

Measured Construct	Question	Factor Loading	Values	Explained Variance （%）
	I will make reference to these reviews on whether to buy this T-shirt.	0.837	b 0.000c	
	After reading the reviews above I would consider buying the T-shirt.	0.887		
	After reading the reviews above I will possibly buy the T shirt.	0.857		
	After reading the reviews above I will be very likely to buy the T shirt.	0.843		

a: the KMO value
b: the chi-squared value of Bartlett's spherical test
c: the p-value of Bartlett's spherical test

Sample Characteristics

A total of 270 responses were collected, of which 95.2% were usable responses ($n = 257$). Using convenience sampling, the questionnaire was made available on Questionnaire Star website, and invitations to participate were sent to Chinese consumers via QQ, WeChat and e-mails. The collected sample included 121 males (47.08%), 201 responses from the bracket of 19 to 25 of age (78.21%), and mostly those younger than 30 years old (97.28%). Most responses came from college students (68.88%).

Reliability and Validity of the Collected Data

The collected data showed strong internal consistency of the responses with Cronbach's Alpha coefficients of all variables greater than 0.7. The data appeared to have good validity suitable for factor analysis as well (with Bartlett Sphericity test p at 0.000 and KMO values all at 0.5). A confirmatory factor analysis suggested that the scale had a good validity structure, with the total explained variance extracted from the characteristic value greater than 1 factor being all more than 50% and the normalized factor loading more than 0.7. See Table 1 for the summary of these results.

DATA ANALYSES

Correlation Analysis

The first analysis conducted was correlation analysis. All correlation confidence level between variables all reached 0.01, indicating a significant correlation between the variables of different types of fake reviews and different dimensions of perceived risk. Findings are summarized in Table 2.

TABLE 2
PEARSON CORRELATION BETWEEN FAKE REVIEWS AND PERCEIVED RISK

Fake Reviews	Functional Risk	Time Risk	Economic Risk
Non-review Content	.468(**)	.462(**)	.376(**)
Advertising Content	.367(**)	.420(**)	.277(**)
Shameless Promotion	.612(**)	.410(**)	.408(**)
Malicious Slander	.482(**)	.587(**)	.472(**)

Note: (**) indicates that the correlation significance level is at the 0.01 level.

All correlations between the three dimensions of perceived risk and the purchase intention were negative at the 0.01 level. Among the three dimensions, time risk was the most relevant to purchase intention, and economic risk had the least correlation with purchase intention.

TABLE 3
CORRELATION ANALYSIS OF PERCEIVED RISK AND PURCHASE INTENTION

	Pearson Correlation with Purchase Intention
Functional Risk	-.434(**)
Time Risk	-.542(**)
Economic Risk	-.285(**)

Note: (**) indicates that the correlation significance level is at the 0.01 level.

Regression Analysis

Separate regression analyses were conducted for each dimension of the perceived risk. First, for functional risk, the impact of *Fake Reviews* as a whole, regardless of the four different types, had a distinguished influence on perceived functional risk (F = 50.374, p = 0.000 <0.01) as expected. Examining the four different types as separate predictors, analysis results revealed significant influence of the three of the four types. Specifically, the *Non-review Content, Shameless Promotion*, and *Malicious Slander* showed significant p-values of .001, .000 and .007, respectively, on perceived functional risk. Analysis results for functional risk is shown in Table 4.

TABLE 4
REGRESSION ANALYSIS FOR FUNCTIONAL RISK

Fake Reviews	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	β	t	*p*
Non- review Content	.185	.057	.185	3.239	.001
Advertising Content	.071	.056	.071	1.272	.205
Shameless Promotion	.436	.056	.436	7.770	.000
Malicious Slander	.160	.059	.160	2.718	.007

For perceived time risk, similar results of overall significance with the p-value of 0.000 were observed for all types of the *Fake Reviews* (F = 42.638, p = .000). As shown in Table 5, all four types of Fake Reviews separately proved themselves as significant predictors by p-values of .003, .020, .079, and .000, respectively. Examining the beta coefficients, the impact of *Malicious Slander* appears to bear the greatest influence on time risk, and the impact of *Shameless Promotion* on time risk was the least.

TABLE 5
REGRESSION ANALYSIS FOR TIME RISK

Fake Reviews	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	β	t	p
Non-review Content	.180	.059	.180	3.026	.003
Advertising Content	.135	.058	.135	2.350	.020
Shameless Promotion	.103	.058	.103	1.763	.079
Malicious Slander	.398	.061	.398	6.514	.000

For perceived economic risk, another set of similar results were observed, showing that the impact of *Fake Reviews* on economic risk had reached a significant level ($F = 23.891$, $p = 0.000 < 0.01$). Different results emerged when each type of *Fake Reviews* was entered as a separate predictor. As shown in Table 6, the significance levels for only the three of four types of *Fake Reviews* were significant at .023, .002 and .000, respectively, for *Non-review Content, Shameless Promotion*, and *Malicious Slander*. It is interesting that consumers did not see the connection between the Advertising Content and the perceived economic risk. The beta coefficients respectively were .150, .198 and .304, indicating that the *Malicious Slander* again demonstrated the greatest impact on economic risk as well as time risk.

TABLE 6
REGRESSION ANALYSIS FOR ECONOMIC RISK

Fake Reviews	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	β	t	p
Non-review Text	.150	.066	.150	2.289	.023
Advertising Comments	.013	.064	.013	.210	.833
Shameless Promotion	.198	.064	.198	3.081	.002
Malicious Slander	.304	.068	.304	4.499	.000

The next regression analysis performed was to assess the impact of perceived risk dimensions on purchase intention. The three dimensions of perceived risk together had a significant effect on purchase intention ($F = 40.074$, $p = 0.000 < 0.01$). As shown in Table 7, the significance levels of the functional risk, time risk and economic risk were 0.001, 0.000 and 0.014, respectively, which indicated that the three dimensions had significant effect on the purchase intention. The beta coefficients were respectively .237, .518, .177, showing time risk as the greatest influence on purchase intention. All three factors had negative influence on purchase intention, as expected. These results support Hypothesis 5.

TABLE 7
REGRESSION ANALYSIS FOR PURCHASE INTENTION

Predictors	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	β	t	p
Functional Risk	-.237	.068	-.237	-3.503	.001
Time Risk	-.518	.072	-.518	-7.173	.000
Economic Risk	-.177	.072	-.177	-2.469	.014

In summary, the impact of Fake Reviews were investigated in subcategories of *Useless Reviews* and *False Reviews*, which were further classified as follows. *Useless Reviews* were classified into *Non-review Content* and *Advertising Content*. Among *Useless Reviews, Non-review Content* had significant influence on all three dimensions of perceived risk, supporting Hypothesis 1 (H1a, H1b, and H1c were all supported). Interestingly, the impact of *Non-review Content* on functional risk was the greatest, and the impact of Non-review Content on time risk was least. *Advertising Content* showed a significant influence on perceived time risk, but did not exhibit obvious impact on function risk and economic risk. Together, these results partially support Hypothesis 2 (H2b was supported, but H2a and H2c were not supported). The second set of analyses involved False Reviews, which were classified into *Shameless Promotion* and *Malicious Slander* reviews. Both correlated with the three dimensions of perceived risk with statistical significance (supporting all H3 and H4). What was intriguing in this set of results was that the most significant impact of *False Reviews* was observed on functional risk and the least impact on time risk. The results of the testing of hypotheses from H1 to H4 are summarized in Table 8. Lastly, all three dimensions of perceived risk negatively influenced consumer purchase intentions, strongly supporting H5 (see Table 7).

TABLE 8
SUMMARY OF REGRESSION ANALYSIS RESULTS FOR FAKE REVIEWS

Fake Reviews		Influence on	*p*	*Hypothesis*
Useless Reviews	Non-review Content	Perceptions of Functional Risk	.001***	H1a
		Perceptions of Time Risk	.003***	H1b
		Perceptions of Economic Risk	.023**	H1c
	Advertising Content	Perceptions of Functional Risk	.205	H2a
		Perceptions of Time Risk	.020**	H2b
		Perceptions of Economic Risk	.833	H2c
False Reviews	Shameless Promotion	Perceptions of Functional Risk	.000***	H3a
		Perceptions of Time Risk	.079*	H3b
		Perceptions of Economic Risk	.002***	H3c
	Malicious Slander	Perceptions of Functional Risk	.007***	H4a
		Perceptions of Time Risk	.000***	H4b
		Perceptions of Economic Risk	.000***	H4c

*: Statistically significant at .1 level
**: Statistically significant at .05 level
***: Statistically significant at .01 level

GENERAL DISCUSSION

The current research has examined the influence of four different types of Fake Reviews on consumer perceptions of risk in a consumer purchase context. The data from 245 Chinese consumers demonstrated that each type of Fake Reviews has a significant impact on perceived risk, and in turn, influences consumer purchase intention. The findings of our research contribute to enhancing the study of online reviews in the extant literature. In particular, the current research has discovered the differential impact of Fake Reviews on consumer perceptions of risks, depending on whether they influence perceptions of functional risk or time risk. Future research should examine the robustness of these findings. The influence of these Fake Reviews may manifest in different ways depending on the variations in the consumption environment, executions of survey instruments, and geographic regions. Explorations in this regard will be helpful in extending the external validity of the current findings.

The current research suggest several implications for various constituents of online reviews. Third-party sites should take more responsibility for the reviews displayed on their webpages. Specifically, they

should proactively identify and remove *Useless Reviews* that are either *Non-review Content* or *Advertising Content*. They should also strengthen monitoring of *False Reviews*, which are either *Shameless Promotion* or *Malicious Slander* reviews. It is important to keep in mind that the purchase intentions of these third party sites may be in jeopardy if they allow these reviews that maliciously defame other businesses. The third party websites must report to the authorities which can then take punitive measures for such malicious behaviors. Retailers should comply with the industry standards and refuse to engage in illegal or unethical behaviors of creating *Shameless Promotion* reviews or *Malicious Slander* reviews. They should adopt an appropriate way to encourage consumers to contribute authentic reviews. Moreover, retailers should strive to engage in healthy competition within the industry. They should take seriously the fact that anyone's *Fake Reviews* containing either *Shameless Promotion* or *Malicious Slander* may negatively influence the credibility of the retailer's website.

Authentic creators of online reviews should cherish the right to publish the truthful reviews. In doing so, consumers will not only effectively reduce their perceptions of risk, especially functional risk and time risk, but also contribute to the advancement of collaborative efforts toward enhanced consumer satisfaction and well-being.

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