Research on the Influence of Online-shopping Additional Reviews on Product Sales of Search Commodity and Experience Commodity

Xintong Zhang, Chong Zhang*, Jingyi Wang
Department of Information Science, Beijing Language and Culture University, Beijing,100089, China
zhangchong@blcu.edu.cn

Abstract. This paper explored the impact of online-shopping additional reviews on sales of search and experience commodity from five perspectives: proportion, length, emotional attitude tendency and time interval. The result shows that the proportion, length, and the emotional attitude tendency of the online-shopping additional reviews have a positive impact on both sales of search commodity and experience commodity. What is more, the number, length and the emotional attitude tendency of online-shopping additional reviews have a larger impact on the sales of experience commodity.

1. Introduction
Online reviews solve the problems that consumers cannot know the quality and appearance of commodities when shopping online. However, many profit-seeking businesses use dishonest means to get fake favorable reviews which greatly reduces the reference value of online reviews. Therefore, E-commerce platforms have introduced “additional reviews”.

This paper selected search and experience commodity as objects, explored how the proportion and length of additional reviews, their emotional attitude tendency and the time interval will affect the sales of the objects. The following are the main contents of the study:

1. Select representations for search and experience commodity by combing the previous studies.
2. Perform word segmentation on additional reviews, build an emotional dictionary based on samples, distinguish emotions of reviews, and finally get the emotional attitude tendency.
3. Analyze the differences in number, length, emotional attitude, and time interval of reviews between search and experience commodity, and then figure out how these factors can influence the sales of various products differently.
4. Finally, give scientific and objective suggestions to businesses and consumers.

2. Overview of Related Theories and Hypothesis

2.1. Online Reviews
The author found that related studies mainly start from three aspects: formation, contents, and influences of reviews by studying the domestic and foreign essays about online reviews. Main results are as follows: Ennew and Binks (1999) explored and analysed commentators’ motivation and found that the reasons to make reviews are to express emotions, protect economic interests, prevent risks and improve themselves [1]. As for the influence of reviews, many studies have shown that online reviews
will affect the sales of products and consumers' purchase decision-making. For example, Shujiang Zhu took Taobao's online reviews of clothes as research object, found that for popular products, number of reviews with pictures, number of reviews, length of each review and the price of products have a significant positive impact on sales. While for non-popular products, only number of reviews with pictures and length of each review have a significant positive impact on sales [2].

2.2. Additional Reviews
Gradually, scholars begin to discover the importance of additional reviews and start to work on it. Wenhua Shi and Xue Gong studied the differences in the number of reviews, time interval, review length and emotional intensity between initial reviews and additional reviews based on different product types and prices [3]. Through questionnaire survey and information adoption model, Fang Tian made an empirical analysis by using statistical software, and found that higher brand familiarity, farther time interval and contradictory additional reviews have a more profound impact on consumers' perceived usefulness, thus affect their purchase intention [4].

2.3. Product Type
From the perspective of information economics, Nelson divides products into two types-search commodity and experience commodity [5]. The characteristic of search commodity is that consumers can know the quality of products through objective attributes provided by merchants. While experience commodity needs actual personal experience and involves personal preference.

2.4. Product Sales
Sales volume generated by online transactions is relatively confidential. Therefore, some scholars have adopted alternative factors when they use product sales. For example, when Qiang Ye studied the influence of online reviews on hotel room sales, it was found that there was a certain linear relationship between the total number of reviews and the hotel online booking volume [6].

2.5. Proportion of Additional Reviews
Higher additional reviews ratio can give consumers more useful information, which will have a positive impact on the sales of products, and the additional reviews ratio of different products should be different. To sum up, we come to the following hypothesis:

H1: The proportion has a significant positive impact on the sales of search commodity
H2: The proportion has a significant positive impact on the sales of experiential commodity
H3: The impact of the proportion on the sales of search commodity is less than that of experience commodity

2.6. Length of Additional Reviews
Longer reviews always contain more information. They can help other consumers know more about products' quality, service, logistics, etc. Hence, length of reviews has an impact on the sales volume. We can make the following hypothesis:

H4: The length has a significant positive impact on the sales of search commodity
H5: The length has a significant positive impact on the sales of experience commodity
H6: The impact of the length on the sales of search commodity is less than that of experience commodity

2.7. Time Interval between Initial and Additional Reviews
Some scholars have found that long time interval between two reviews means that reviewers use products for a long time, which makes potential consumers generate a stronger sense of usefulness. Time has an impact on the influence and usefulness of reviews. Therefore, we can make the following hypothesis:
H7: Time interval between initial and additional reviews has a significant positive impact on the sales of search commodity
H8: Time interval between initial and additional reviews has a significant positive impact on the sales of experience commodity
H9: Time interval between initial and additional reviews has a greater impact on the sales of search commodity than that of experience commodity

2.8. Emotional Attitude Tendency of Additional Reviews
Many scholars found that different emotional tendencies expressed in reviews will have different effects on the sales. Therefore, we can suppose that the emotional attitude tendency of additional reviews will also have different effects on the sales. We can make the following hypothesis:
H10: The emotional attitude tendency of additional reviews has a significant positive impact on the sales of search commodity
H11: The emotional attitude tendency of additional reviews has a significant positive impact on the sales of experience commodity
H12: The emotional attitude tendency of additional reviews has a smaller impact on the sales of search commodity than that of experience commodity

3. Data Collection and Preprocessing
3.1. Sample Selection and Data Collection
The paper selected JD.com as data source and used the total number of reviews to replace sales volume. Home appliances were selected as the representative of search commodity, and snacks were the representative of experience commodity. Entered "snacks" and "home appliances" in the search box of JD.com, picked 12 snack shops and 11 home appliances shops, then ranked the products in each shop according to sales volume and sampled them by layers, with about 10 products extracted from each layer. Used crawler software-Octopus data collector to build a model, and crawled data of each commodity. Finally, a total of 112,971 additional reviews were captured, and 106,015 effective additional reviews were saved after deleting some useless reviews.

3.2. Emotion Recognition of Review Text
The paper used GooSeeker to perform the emotion recognition of reviews. To improve the accuracy of emotion recognition, the paper arranged the sentiment dictionary of samples according to the additional reviews, and imported GooSeeker’s own sentiment dictionary as supplement.

The paper imported additional reviews of all products in each store into GooSeeker for word segmentation and obtained word frequency table, from which sentiment words with higher word frequency were proposed, with positive words assigned 1 and negative words assigned -1, and a sample sentiment dictionary was built. Then the paper imported the sample sentiment dictionary data table into the GooSeeker to get the sentiment tendency of additional reviews. GooSeeker itself divides reviews into positive negative and neutral, but it is difficult to define the neutral standard. Thus, the paper divided neutral reviews into positive and negative manually, and sorted each product into a table according to product ID.

3.3. Variable Pre-processing
The paper captured store name, product ID, total number of reviews, number of additional reviews, content of additional reviews, time interval as data fields. The dependent variable is the sales volume, which is replaced by the total number of reviews. Independent variables are the proportion of additional reviews, average length of additional reviews, average time interval and the emotional attitude tendency of additional reviews.
4. Model Building and Analysis

4.1. Descriptive Statistical Analysis
Descriptive statistical analysis is mainly used to describe the data samples simply, which can help to have a general understanding of the data samples. The paper used SPSS Statistics 22 to make descriptive statistical analysis on search commodity samples and experience commodity samples respectively, standardized each variable and saved it as a new variable.

Descriptive statistics of search commodity Fig.1(a) and descriptive statistics of experience commodity Fig.1(b):

![Descriptive Statistics of Search and Experience Commodities](image)

According to Fig.1(a) and Fig.1(b), the average additional reviews ratio of search commodity is greater than that of experience commodity; the average review length of search commodity is shorter than that of experience commodity; the average time interval of search commodity is shorter than that of experience commodity; the emotional attitude tendency of search commodity is smaller than that of experience commodity.

4.2. Regression Analysis
The paper used multiple linear regression to find the influence of various variables on commodity sales. There are five methods of multiple linear regression in SPSS: entry, step-by-step, deletion, forward, before and after. The paper chose step-by-step.

4.2.1 Model Building
According to the influence of each dimension of additional reviews on sales volume, the paper built a regression equation, and the expression of the regression equation is as follows:

\[
\text{Sales} = \alpha_1x_1 + \alpha_2x_2 + \alpha_3x_3 + \alpha_4x_4
\]  

Sales represents the sales volume of products, \(x_1\) is the proportion of additional reviews, \(x_2\) is the average length of additional reviews, \(x_3\) is the average time interval between initial and additional reviews and \(x_4\) is emotional tendency.

The paper used new variable generated by the above data standardization to replace the original variable and carried out stepwise regression.

4.2.2 Data Processing
4.2.2.1 Search Commodity
![Model Summary and Variance Analysis](image)

It can be seen from Fig.2 that the fitting degree of model 3 is the highest, and the adopted variables are \(x_1\), \(x_2\) and \(x_4\). The independent variable of model 3 can only explain 47.1% of the change of dependent variable. The significance value is approximately 0<0.05, reaching the significance level,
which indicates that the regression equation is valid.

\[
\text{Sales} = 0.443x_1 + 0.193x_2 + 0.248x_4 \quad (2)
\]

4.2.2 Experience Commodity

It can be seen from Fig.4 that the fitting degree of Model 3 is the highest. The independent variable can explain 88.9% of the change of the dependent variable. The significance value is approximately 0<0.05, reaching the significance level, which indicates that the regression equation is valid.

\[
\text{Sales} = 0.509x_1 + 0.231x_2 + 0.269x_4 \quad (3)
\]

4.2.3 Result Analysis

1) The proportion of additional reviews has a significant positive effect on the sales of search commodity and experience commodity. H1 and H2 are proved. The impact of the proportion of additional reviews on the sales of search commodity is less than that of experience commodity, H3 is also proved.

2) The average length of additional reviews has a significant positive effect on the sales of search commodity and experience commodity, H4 and H5 are proved. The impact of additional reviews length on the sales of search commodity is less than that of experience commodity, H6 is also proved.

3) The average time interval between initial and additional reviews does not have a significant impact on the sales of search and experience commodity. So, we cannot compare their influence on the dependent variable, H7, H8 and H9 are not proved.

4) The emotional attitude tendency has significant impact on the sales of search commodity and
experience commodity, H10 and H11 are proved. The impact of emotional attitude tendency on the sales of search commodity is less than that of experience commodity, H12 is also proved.

5. Conclusions
This paper mainly draws the following conclusions:
1) The proportion of additional reviews has a positive impact on the sales of search commodity and experience commodity. A large proportion of additional reviews can give consumers more information, help them make purchase decisions and finally promote sales.
2) The length of additional reviews has a positive impact on the sales of search commodity and experience commodity. The longer the length of additional reviews, the more other consumers can know about the product.
3) The emotional attitude tendency of additional reviews has a positive impact on the sales of search commodity and experience commodity. Larger emotional attitude tendency value indicates a greater proportion of positive reviews. Positive emotions can attract potential consumers and promote sales.
4) Compared with search commodity, experience commodity is more influenced by the proportion, length and emotional attitude tendency of additional reviews.

6. Suggestions
For businesses, they could make good use of ‘additional reviews’ to encourage consumers to express their true feelings. They could correct and improve themselves based the negative reviews received. Different types of businesses should focus on the aspects that consumers value and try to do better on those aspects.

For consumers, they could make good use of ‘additional reviews’ to express their feelings, experiences, and evaluation of products truly and objectively, to better guide future consumers to make purchase decisions.

For online shopping platforms, they could establish a better online review supervision mechanism to avoid malicious bad reviews among merchants due to competition, which will reduce the credibility of reviews and decrease consumer satisfaction.

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Chong Zhang, Corresponding author, associate professor of Beijing Language and Culture University.

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