Research on the Factors Influencing the Usefulness of Online Reviews

--Mediating Effect based on Online Interaction

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Abstract

The model of the influence of comment media richness and comment emotional intensity on comment usefulness was constructed, and the mediating role of online interaction was explored. Using 2,923 online reviews of notebooks in Jingdong platform, the findings show that (1) review media richness, sentiment intensity and online interaction can promote the usefulness of reviews; (2) review media richness has an effect on review usefulness directly and indirectly through online interaction; online interaction plays a fully mediating role between the effect of sentiment intensity on review usefulness.

Keywords

Online Reviews; Review Usefulness; Online Interaction; Mediating Effect.

1. Introduction

With the development of information technology, online shopping has become an important part of people's daily life. When users make online purchases, they browse product descriptions and online reviews to quickly understand product information and help them make decisions. Research shows that 90% of users read online reviews of related products before shopping, and 83% of users think online reviews will influence shopping decisions. However, the sheer number of online reviews makes it impossible for users to choose between them, creating a cognitive burden. Research on the usefulness of online reviews can help users quickly identify useful online reviews, reduce their search costs, improve the competitiveness of platforms, and enhance the credit reputation of merchants.

Research on review usefulness has mainly focused on the study of the influencing factors of review usefulness. Relevant studies are mainly on the influence of review features, reviewer features, and platform features on review usefulness, and the research model only considers the direct influence of the above features on review usefulness, lacking the study of mediating variables. Considering the functional characteristics of online reviews at this stage, this paper explores the influence of review emotional intensity and review media richness on review usefulness among online review features, and incorporates online interaction as a mediating variable in the research model.

2. Theory and Research Hypothesis

2.1. Social interaction theory

Social interaction is a social action in which people interact and influence each other through information exchange between people, and groups in society. It can be used to explain or express their behavioral opinions to others. Social interaction has the following five characteristics: first, the object of social interaction is at least two people; second, the

interaction is triggered by matters that are interconnected between individuals and groups; third, social interaction occurs in certain situations, and the same action occurs at different times and places and has different meanings for different objects; fourth, social interaction does not only occur in face-to-face situations. Media such as telephone and Internet are used for communication and interaction; fifth, social interaction is based on information transfer. Through interaction, individuals can communicate with each other in terms of ideas and emotions. Pictures, words and other symbols are interactive tools for individuals to communicate and influence each other.

Social interaction can share information through group knowledge, effectively solve the problem of information asymmetry, and change users' attitudes and behaviors. Ding found that users' attitudes towards serious answers can bring both sides of the interaction closer together, increasing trust in the respondent and thus changing the user's behavior[1]. Tang confirmed that when users communicate with merchants about products before purchase, positive responses from merchants can show positive attitudes toward users and increase their trust in the merchant, leading to purchase behavior[2]. The online interactive function in the e-commerce platform can effectively close the distance between users and commenters, and through online interaction users can target questions and answers to improve the efficiency of information acquisition.

2.2. The effect of review emotional intensity on review usefulness

Emotional cues can be effectively transmitted and perceived between people. Consumers tend to transmit emotions through online reviews when they are satisfied or disappointed with a product or service. By browsing online reviews, users can perceive the reviewer's attitude toward the product, reduce the ambiguity of review information, and improve the diagnosability of online reviews. According to the two-stage expectation-dismissal model proposed by OLIVER et al. it is known that consumers will collect product information and form their expectations of the product before the purchase behavior occurs; when the user completes consumption, the real product experience will form a dismissal effect with the pre-purchase expectations[3,4]. When the perceived quality of the product is greater than the expectation, a positive failure test is formed, generating positive emotions such as satisfaction; when the perceived quality of the product is less than the expectation, a negative failure test is formed generating negative emotions. The greater the difference between users' perceived product quality and expectations, the stronger the users' review sentiment. Fang believes that the stronger the review sentiment is, the clearer the review is, and the more words the review has[5], The more product information is included, the more useful it is to users as it can effectively reduce the ambiguity of reviews. In summary, the following hypotheses are proposed.

H1: The emotional intensity of a review positively affects the usefulness of the review.

2.3. The effect of review media richness on the usefulness of reviews

Information is delivered through different media, and the use of different media affects the amount and effectiveness of information delivery, with common media such as text, audio, and pictures. Scholars believe that the characteristics of different media are different; text is abstract, core, essential and de-contextualized, which can capture the main features of things and has a strong subjectivity; pictures are concrete, situational, retain more details and show more concrete and objective[6], and are more attractive and easy to understand compared to text. Information is processed differently in different media, and it is known from dual coding theory that individuals have two independent cognitive processing systems, one is the verbal system used to process textual language; the other is the visual system used to process spatial, nonverbal information[7-9], and when individuals use the visual system for information processing, it is faster and produces closer mental distance. To facilitate the study, this paper

adopts Zhu Linlin's classification of media richness, which classifies online review media richness as low (text only), medium (text + image), and high (text + image + video)[10].

Review media richness has an important impact on the usefulness of reviews. First, high media richness is more likely to attract users and reduce their information search costs. Through the study of web streaming video usage, it is found that using streaming video is more likely to attract users' browsing, and users prefer information with richer display methods[11]; High comment media richness can effectively reduce the ambiguity of information, improve communication efficiency, and reduce users' information search cost[12]; secondly, media richness can improve the ease of use of information, which in turn improves its usefulness. Users will have an easier time in processing information such as images and videos compared to text. Low-rich text comments are considered abstract and barren, and users cannot quickly visualize specific scenes, while high-richness media such as text plus pictures and videos are considered rich and simple, and can effectively concretize textual abstract content; videos are more able to show the information expressed by the commenter through a coherent, dynamic display, the higher the perceived value to the user. Finally, it can improve the trust in the commenter. The higher the media richness of the review, the higher the cost paid by the reviewer, and the more users tend to attribute their reviews to the product and perceive the reviewer as objective and trustworthy, improving trust in the reviewer and trust in the review information[13], The following hypothesis is proposed.

H2: Media richness has a positive effect on the usefulness of online reviews.

2.4. The mediating role of online interaction

Users make initial judgments about comments and commenters through comment sentiment intensity in order to make decisions about whether to initiate further communication. Compared to strong emotional intensity online reviews, weak emotional intensity online reviews use some low emotional vocabulary, express more abstractly, and the reviewer's position is vague and perceived as indifferent, which does not resonate with users' emotions. When users browse this type of reviews, they believe that the reviewer has too low expectations of the product, does not put enough cognitive effort, and attributes the motivation of the review to the reviewer, reducing the user's interest in learning more about it. The stronger the emotional intensity, the lower the consistency of the review with other reviews, contains more subjective words, strengthens the subjective feelings of consumers, can effectively improve the emotional resonance between users and reviewers, and strong emotional expression can effectively mobilize the desire for communication between individuals. In summary, the following hypotheses are proposed.

H3:The intensity of comment sentiment has a positive effect on online interaction.

Online reviews differ in their impact on users' online interactions by different media richness. Users' interaction is influenced by the quality of information provided by the interacting party and their trust in the interacting party. The higher the media richness, the richer the information contained in the review, and the more useful information the user obtains when browsing, the higher the information quality of the review; the media richness of the review can improve the user's trust in the interactor. High-richness media reviews retain more product cues and social cues, and users develop a stronger sense of intimacy and involvement with them, which improves users' trust in the reviewer and users are more inclined to initiate online interactions with people they trust.

H4: Comment media richness has a positive effect on online interaction.

Review online interaction refers to the communication and interaction between reviewers and users for product information. According to social interaction theory, interaction can help users resolve information asymmetry and increase the intimacy and trust with the interaction object. When users browse online reviews and become interested in or confused about a specific

online review and want to learn more about the details of the review, they will initiate an online interaction below the review, and the reviewer or other users will answer. Online interactions are more targeted and purposeful, and can solve users' questions more quickly. Previous research on online interactions has focused on online interactions between sellers and users, and concluded that sellers' responses positively influence the credibility of the interaction content[13] and users' purchase intentions. Compared with sellers, buyers, as users of products, have more say in the specific use of products and can give realistic descriptions of products through their own experiences, helping users identify the advantages and disadvantages of products and reducing uncertainty. The greater the number of interactions, the greater the amount of useful information about the product included, and the more it can help users make decisions; online interactions also significantly affect users' trust in the reviewer; the higher the level of interaction between the reviewer and the user, the stronger the familiarity between the two parties and the user's virtual presence; presence as a necessary condition for generating trust, and a rich sense of presence can improve users' trust[14]; online interactions from information content and sources Both aspects contribute to the generation of comment usefulness. Accordingly, the following hypothesis is proposed.

H5: Online interaction has a positive effect on review usefulness.

Exploratory information search is the main way for users to obtain information in an unknown situation, and it consists of the following four stages: browse, search, evaluate, and integrate[5]. At the beginning of exploratory search, because individuals are unclear about the information background and search goals will quickly read a lot of, rough information to supplement the basic knowledge, when individuals have a basic concept will be explored for specific problems and goals, after which the information obtained is evaluated and analyzed, has determined whether further information search is needed, and finally the information is systematically integrated, and its information search of browsing and searching can be alternated with each other. Exploratory search is mainly used in the field of inquiry learning[15] and information system search[16]. In this paper, we argue that users browse online reviews (browsing) - interact with the reviewer (searching) - evaluate the usefulness of the review information (evaluating) is also consistent with the exploratory information search process, where users browse online reviews only to be able to read passively and choose to (partially) accept or (partially) reject the content of the review information, with a high degree of uncertainty about the content of the information. Users need to fill information gaps according to their own goals, and online interaction can help users actively search for information and communicate with consumers to obtain valuable information by means of Q&A.

According to the theory of emotional rendering, it is known that when individuals communicate with each other, they will potentially and continuously imitate the actions and expressions of others, and eventually trigger emotions similar to others. Emotions are considered as a kind of information that can help users identify information and make decisions. However, it is not sufficient to judge the usefulness of a review only by the sentiment intensity of online reviews. After users identify the review sentiment, they can confirm relevant information or ask questions about the information they are interested in through online interaction to solve the problem of product information asymmetry and improve the perceived usefulness of the reviews. Accordingly, the following hypothesis is proposed.

H6a: Online interaction plays a mediating role between review sentiment intensity and review usefulness.

As can be seen from H2a, media richness has a positive effect on the usefulness of online reviews, and high media richness reviews require more time and effort from the reviewer and are more immersive to the user for their reviews, which helps to improve the user's perception of usefulness of the review information and trust in the reviewer. However, the amount of text (no more than 150 words), pictures (no more than 9), and video length (no more than 10

seconds) posted in online reviews is limited by the system functions, and reviewers can only post partial product information. When users want to get more product information, they need to initiate online interaction with their trusted reviewers to exchange product information with them. Online interactions are often highly purposeful and can effectively improve users' perception of the usefulness of reviews. Accordingly, the following hypothesis is proposed.

H6b: Online interaction plays a mediating role between media richness and review usefulness. In summary, the conceptual model is constructed Figure 1.
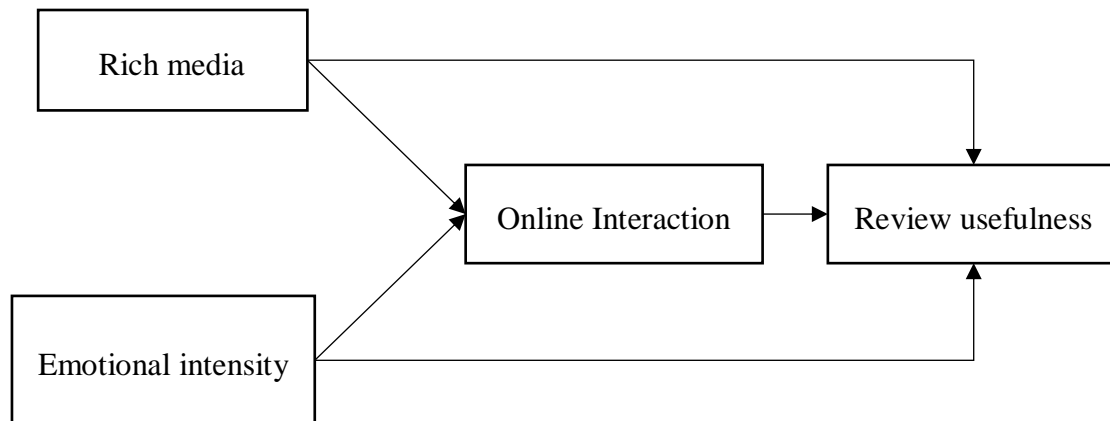

Figure 1. The conceptual model

3. Data collection and empirical analysis

3.1. Variable Settings

This paper contains 7 variables, which contain 3 control variables, 2 independent variables, 1 mediating variable, and 1 dependent variable. And control conditions are set in the selection of the sample to improve the rigor of data analysis. The measures of specific variables are shown in Table 1.

Table 1. Operational definition of variables

Variable Category	Variable Name	Variable representation/classification method
Independent variable	Emotional intensity	BaiduNLP directly labeled positive/negative, positive coded as 1, negative coded as 0, according to the relevant literature to Baidu NLP emotional tendency of the classification confidence [0,1] as emotional strength
	Comment Media Richness	Only text is low richness, coded as 1; text + image/video, medium richness, coded as 2; text + image + video, high richness, coded as 3, only image + video is classified as medium richness, image or video is low richness
Intermediate variables	Online Interaction	The number of replies at the bottom right of the online comments
Dependent variable	Review usefulness	Number of votes for comments
Control variables	Length of comments	the number of words in the comment
	additional comments	1 for including additional comments, 0 for not including
	Purchase distance from the comment time	Number of days between purchase and commenting

3.2. Data collection

In this paper, we filtered Jingdong electronic products, and filtered out self-owned products by "Jingdong Logistics" condition. We use python to write the automated crawler into the program, and get a total of 241892 reviews of 300 products, taking into account the reviews with 0 votes, which receive less attention, and the reviews with 1 and 2 votes, which have a certain chance, we filter out the reviews with more than 3 likes, more than 2 online interactions, less than 50 product reviews, and the absolute value of the standard deviation of the variables is greater than 3. The remaining 38 product reviews totaled 2923.

3.3. Descriptive statistics and correlation analysis of variables

Descriptive statistics can help to capture the basic characteristics of the data, and the descriptive statistics used in this study contain mean, standard deviation, skewness, and kurtosis. 2923 reviews were used in this study. The variables involved in the model were analyzed using spss26 for descriptive statistics and correlation analysis, and the detailed results of the analysis are shown in the table.

Table 2. Descriptive statistics(N =2923)

Variable Category	Variable Name	Variable Symbols	Mean	S.D	Kurtosis	Skewness
Dependent variable	Usefulness of comments	helpness	8.872	6.077	4.124	1.958
Independent variable	Media Richness	medium	1.736	0.8	-1.258	0.512
	emotional intensity	emotion	0.768	0.084	7.917	1.55
Intermediate variables	Online Interaction	interaction	5.571	3.646	2.273	1.528
Control variables	Additional Comments	add_com	0.191	0.393	0.486	1.577
	Comments on time from purchase	com_time	10.104	10.954	3.231	1.838
	Comment Length	com_len	68.185	61.04	0.971	1.167

From the skewness and kurtosis indicators, the absolute values of skewness of the sample data ranged from 0.065 to 1.958, all of which were less than 2; the absolute values of sample kurtosis ranged from 0.486 to 7.917, all of which were less than 8, meeting the criteria of absolute value of skewness less than 3 and absolute value of kurtosis less than 10. It indicates that the 2923 data used in this paper meet the requirements of normal distribution.

Table 3. Results of correlation analysis of variables

	helpness	medium	emotion	interaction	add_com	com_time	com_len
helpness	1						
medium	0.266**	1					
emotion	0.098**	0.230**	1				
interaction	0.518**	0.368**	0.151**	1			
add_com	-0.034	-0.033	-0.009	-0.003	1		
com_time	-0.092**	-0.177**	-0.074**	-0.109**	-0.043*	1	
com_len	0.113**	0.573**	0.202**	0.210**	0.005	-0.126**	1

Note: * represents p within 0.05, ** represents p within 0.01, *** represents p within 0.001

The Pearson correlation coefficient is used in this paper, and it can be seen from Table 5.2: most of the variables are correlated, but the correlation coefficients are less than 0.7. Referring to the standard point of correlation coefficient of 0.7 proposed by Ming-Lung Wu[17], it is considered that the correlation between the variables involved in this paper is not significant.

3.4. Analysis of results

3.4.1. Multiple regression analysis

Hierarchical regression analysis was used to verify the effects of comment medium richness and comment sentiment intensity on online interactions. In the first-level model, comment length, the presence or absence of additional comments, and the time between purchase and comment posting were analyzed as control variables (Model 1). In the second level model the medium richness of comments and the emotional intensity of comments were included in the regression model as independent variables (model 2 and model 3), respectively, and online interaction (interaction) was included in the regression model as the dependent variable. The results of the regression analysis are shown in Table 4, which shows that the emotional intensity of reviews has a significant positive effect on the usefulness of reviews ($\beta=0.109$, $p<0.001$); the media richness of reviews has a significant positive effect on the usefulness of reviews ($\beta=0.362$, $p<0.001$), and the data results indicate that the media richness of reviews and the emotional intensity of reviews have a positive effect on the usefulness of online reviews. Hypothesis H3 and H4 were verified, and the second step of the mediating effect test was completed.

Table 4. Results of regression analysis of media richness and comment sentiment intensity on online interaction

Variables	interact		
	Model 1	Model 2	Model 3
com_len	0.200***	0.178***	-0.003
add_com	-0.007	-0.006	0.008
com_time	-0.084***	-0.079***	-0.045**
emotion		0.109***	
medium			0.362***
R^2	0.051	0.062	0.138
$Adj.R^2$	0.050	0.061	0.137
F	52.456***	48.573***	116.485***

Note: * represents p within 0.05, ** represents p within 0.01, *** represents p within 0.001

Hierarchical regression analysis was used to verify the effects of comment medium richness and comment sentiment intensity on online interactions. In the first-level model, comment length, the presence or absence of additional comments, and the time between purchase and comment posting were analyzed as control variables (Model 1). Online interaction was included in the regression model as an independent variable in the second level model (Model 2), comment sentiment intensity and comment media richness were included in the third level model (models 3 and 4), respectively, and comment usefulness was included in the regression model as a dependent variable. The results of the regression analysis are shown in Table 5. From the results of Model 2 in Table 5.5, it can be seen that online interaction has a significant positive effect on comment usefulness ($\beta=0.514$, $p<0.001$), and Hypothesis H5 is verified. From the results of model 3, it can be seen that comment sentiment intensity has no significant effect on comment usefulness, but online interaction has a positive effect on comment usefulness ($\beta=0.512$, $p<0.001$), indicating that online interaction plays a fully mediating role between comment sentiment intensity and comment usefulness, and hypothesis 6a is verified. As shown in Model 4, comment media richness has a significant positive effect on comment usefulness ($\beta=0.115$, $p<0.001$); online interaction has a significant positive effect on comment usefulness ($\beta=0.485$, $p<0.001$), which means that online interaction plays a partially mediating role between media richness and comment usefulness, and Hypothesis 6b is verified.

Table 5. Results of the analysis of the mediating effect of online interaction

Variables	helpness			
	Model 1	Model 2	Model 3	Model 4
com_len	0.103***	.000	-0.003	-0.059**
add_com	-0.038**	-.034**	-0.034**	-0.030*
com_time	-0.081***	-.037**	-0.037**	-0.027*
emotion			0.019	
medium				0.115***
interact		0.514***	0.512***	0.485***
R^2	0.020	0.271	0.272	0.279
$Adj.R^2$	0.019	0.270	0.270	0.278
F value	20.125***	271.496***	217.485***	225.956***

Note: * represents p within 0.05, ** represents p within 0.01, *** represents p within 0.001

3.4.2. Robustness testing using Bootstrap

Bootstrap method was used to conduct robustness analysis on the mediating effect of online interaction. Bootstrap analysis was conducted with comment sentiment intensity and comment media richness as independent variables, comment usefulness as dependent variable, and online interaction as mediating variable, respectively, and the upper and lower values of 95% confidence intervals for direct and indirect effects were obtained by Bootstrap analysis (see Table 6), and the interval of direct effect of comment sentiment intensity on comment usefulness was [- 0.5438, 3.1499], which contains 0, indicating that the direct effect of comment sentiment intensity to comment usefulness is not significant, and the interval of the indirect effect of comment sentiment intensity to comment usefulness is [3.1053, 4.9409], which does not contain 0, indicating that the indirect effect is significant, thus it can be seen that online interaction has a fully mediating role in the relationship between comment sentiment intensity and comment usefulness, again verified hypothesis H6a. the interval of the direct effect of comment media richness on comment usefulness was [0.5713, 1.1849], which did not contain 0, indicating that the direct effect of comment sentiment intensity on comment usefulness was not significant, and the interval of the indirect effect of comment media richness on comment usefulness was [1.1208, 1.5515], which did not contain 0, indicating that the indirect effect was significant, from which it can be seen that Online interaction has a partially mediating role in the relationship between comment media richness and comment usefulness, which again verifies hypothesis H6b.

Table 6. Results of the analysis of different paths of mediating effects of online interaction

Intermediary effect path	Effect	BootSE	BootLLCI	BootULCI
Total effect:emotion→helpness	5.3492	1.098	3.16	7.483
Direct effect:emotion→helpness	1.3445	0.9436	-0.5438	3.1499
Indirect effects:emotion→Interact→helpness	4.0047	0.4603	3.1053	4.9409
Total effect:medium→helpness	2.2112	0.186	1.855	2.584
Direct effect:medium→helpness	0.8754	0.1601	0.5713	1.1849
Indirect effects:medium→Interact→helpness	1.3358	0.1089	1.1208	1.5515

4. Research conclusions and recommendations

4.1. Conclusion

Based on the studies of domestic and foreign scholars, this study explored the effects of review sentiment intensity, review media richness on review usefulness directly and through online interaction, and the moderating roles of product characteristics and review sentiment validity

in this process. Through text sentiment processing, regression analysis and Bootstrap test, we found that (1) the sentiment intensity of reviews, the media richness of reviews, and online interaction have significant positive effects on the usefulness of online reviews; (2) online interaction has a partially mediating role in the media richness of reviews on the usefulness of reviews, and online interaction has a fully mediating role in the sentiment intensity of reviews on the usefulness of reviews. effect.

4.2. Suggestions

Based on the above findings, the following practical suggestions can be provided for the platform.

(1) The media richness of comments can improve the usefulness of comments, and the platform can expand the ways of online comments, not limited to the existing as text, silent video, and pictures. Considering the time cost of user comments and the attractiveness of comments, the platform can allow audio video comments and interesting video comments to attract more commenters and users.

(2) Online interaction can improve the usefulness of comments, the existing platform about the proportion of online interaction is still relatively small, the platform can give rewards to users who participate in online interaction, or provide more forms of online interaction to improve their enthusiasm.

(3) In addition to the traditional time ranking and comprehensive ranking, the platform can incorporate the media richness of comments, the number of online interactions, and the emotional intensity of comments into the prediction model to identify valuable online comments, so as to scientifically predict the online comments with greater influence on users.

5. Research Prospects

This study analyzes the influence factor model of online review media richness and online review emotional intensity on review usefulness, and improves the influence factor model of review usefulness with product characteristics as the moderator and online interaction as the mediator, and draws a series of valuable conclusions, but the article still has some limitations.

(1) The target object of the study is limited to high-involvement products, and further research can be conducted on low-involvement products in the future. In the sample sampling, the usefulness of comments less than 3 was excluded, and the usefulness of comments with less than 3 likes was not judged.

(2) The usefulness of users' comments is influenced by their own professional level and ability, etc. This paper considers the characteristics of the comments themselves and the characteristics of the products, and does not consider the users' own motivation and ability, which can be further studied in the future.

(3) The data comes from Jingdong, I don't know whether the conclusion is applicable to other e-commerce platforms, it needs to be further verified. Product characteristics only consider the hot and coldness of the product and the price of the product, and can be refined in depth in the future from the brand reputation, practicality, etc.

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