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How Does Word of Mouth from Different Components Systems Influence Product Sales differently?

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(Work in Progress)

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ABSTRACT

Online word-of-mouth (WOM) has become an important reference for customers' online purchase decisions. However, current studies ignore the various effects of WOM in different components, i.e., online reviews and the replies in the question and answer (Q &A) discussion area. To fill such a research gap, this study explores the relationship between WOM in two different forms and product sales. We measure the semantic features and thematic consistency of two forms of WOM and product sales. The findings show that the review component and Q&A component differ significantly in terms of quantity and content richness, with the review component being richer and more voluminous and the Q&A section having less content and relatively less quantity in comparison. Besides, the OLS results suggest that topic consistency has a negative impact on product sales, while the richness characteristics of both have a positive impact on product sales, and that the content richness of the Q&A component has a greater impact on sales than the review component.

Keywords: Online review components, Q&A components, user-generated content text analysis, semantic features, topic consistency

INTRODUCTION

Online shopping has developed rapidly in the background of COVID-19, and the research on factors affecting product sales is getting more and more important for the online business (Wang, 2020). Word-of-mouth (WOM), the feedback, recommendations, or opinions from consumers' family, friends, sellers, or from others who have purchased the product or service (Murray, 1991), has been one of the most effective factors in influencing consumers (Helm, 2007). WOM shows its impact on product sales in various platforms, including Amazon, online book reviews, and box office revenues, and these studies validate the direct link between consumer reviews and sales of products.

More and more businesses are recognizing the importance of online WOM and encouraging consumers to share their buying experiences and engage with others in order to gain more potential customers. WOM is aggregated in such a process of interaction among the experienced consumers who have already purchased, potential consumers, and sellers. In Figure 1, it is shown that the WOM from online reviews and also Q&A forums in Qunar, one of the most popular online traveling agencies in China. The communication forms and contents are different and form different WOM in these two components systems.

The Q&A area is an area for customers to discuss issues, so it is a "many-to-many" situation; in contrast, reviews are a "one-to-many" form because many consumers can make judgments about products by referring to a specific review, but the number of discussions generated by reviews is relatively small compared to the number of responses under Q&A, and therefore the aggregation level is low. According to the consumer decision-making process (Colicev *et al.*, 2017), consumers are able to identify the general characteristics of a product with reference to many-to-many WOM during the purchase process and then make judgments and choices in combination with many-to-many WOM and one-to-many WOM.

Although multiple WOM sources have been developed, applied, and studied, it is still found that the information in the online review and Q&A forums encounter diverse situations. The merchants seem to prefer to reply with online reviews, ignoring the question in Q&A forums where have less information. Even in academia, most of the current studies focus only on the online reviews and still lack probing the WOM from Q&A forums considering with different information granularity. Therefore, in order to fill the research gaps, we hope to address the following two research questions in this study:
RQ1 How do the impacts of WOM from review systems and Q&A forums on sales vary?
RQ2 What are the detailed differences in WOM characteristics (emotion, quantity, richness) between WOM from review systems and Q&A forums?

This paper explores the differences in the impact of different presentation forms of online word-of-mouth on consumer decision-making at both coarse-grained and granular levels, which contribute to the WOM research. In practice, the study not only guides merchants to develop effective marketing strategies but also helps consumers to identify informative review information and also helps potential consumers to reduce information overload.

Figure 1: The different WOM from reviews system and Q&A forum.

REVIEW OF EXISTING STUDIES

There are numerous studies on online reviews and consumer decision-making, from the early days of studying price and volume (Liu, 2006; Marchand *et al*., 2017; Colicev *et al.,* 2017; Xie & Lee, 2015), which have gradually deepened to emotional value (Tellis *et al.*, 2019), language features (Bastos & Moore, 2021; Packard & Berger, 2020; Tellis *et al.,* 2019; Packard *et al.*, 2018), and other detailed levels of exploration. However, these previous studies at the detailed level either focus on laboratory settings or originate from manipulated data, lacking the support of actual purchase environment data (Bastos & Moore, 2021; Packard & Berger, 2020). Besides, the macro-level of operations also works(e.g., volume and valence, (Colicev *et al.,* 2017). Consumers make purchase decisions by examining not only information about the accessibility of goods but also considering their own judgments when given diagnostic information (Colicev *et al.,* 2017).

As word-of-mouth has been explored, more and more scholars have expanded on the detailed characteristics (e.g., price, quantity, etc.) studies. Chevalier and Mayzlin (2006) argue that consumers do not rely on the number of reviews but place more importance on the quality of the information in online reviews, such as emotional disposition (Tellis *et al*., 2019), content richness (Nguyen & Chaudhuri, 2018), and content substantiality (Bastos & Moore, 2021). However, detailed level research is less operational due to the difficulty of directly guiding marketing strategy adjustments, leading more WOM research to start combining with tangible micro information (e.g., topic similarity, linguistic features, etc., Aghakhani *et al*., 2020) in order to better guide business practices.

In addition to this, other related consumer engagement behaviors may also have different impacts on value creation, Dhaoui and Webster (2021) by examining consumer engagement behaviors outside of value creation on FBP (endorsement, feedback, recommendation, conversation, and consensus), demonstrating that each of these behaviors is related to each other and that consumer decisions are influenced not only by these behaviors but also by other consumers. Although studies have been conducted to explore the difference between forums and reviews in the sales process and there is a large literature on the impact of word-of-mouth, few studies have combined the two, which is important for enriching merchants' marketing decision strategies and addressing consumers' information redundancy, and this study is expected to fill this research gap.

RESEARCH FRAMEWORK

There are four stages of the sales funnel in the decision process, including awareness, interest, decision, and action (AIDA)[1], and in the above-mentioned consumer decision process, we choose the consumer behavior in the decision stage as the main object of study. From the perspective of information acquisition, consumers in the decision stage are driven by the persuasive mechanism of the central path and are concerned with both the diagnostic and accessibility of information. Therefore, it is at the decision stage that consumers are more likely to refer to the comments and Q&A sections and make their choices and judgments (Petty & Cacioppo, 1986; Feldman & Lynch, 1988).

Differences in information paths and psychological mechanisms make the impact of word-of-mouth in the comment and Q&A sections both similar and different. We refer to Yang's (2021) framework and propose a research framework in which quantity, length, and thematic similarity synergistically influence consumer decisions. The framework is presented in Figure 2.
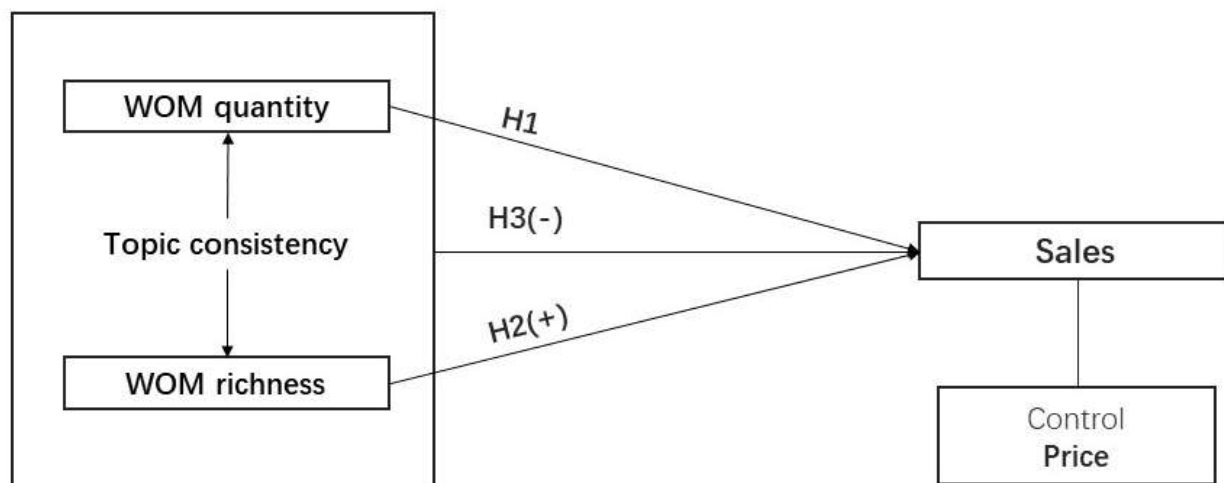

Figure 2: the conceptual framework of the study.

WOM Quantity

There has been extensive research that proves that the number of consumer reviews positively affects purchase, Marchand's (2017) study explores the impact of the number of consumer reviews and Twitter WOM on new products at different stages, the results show that before the release of a new product the number of consumer reviews and Twitter WOM quantity had a significant positive impact on product sales, while when the product was released, the impact of Twitter word-of-mouth quantity gradually diminished while the impact of consumer review quantity gradually increased (Marchand *et al.*, 2017). In addition, products with a high number of reviews are also more likely to be favored by platforms, receive front-page recommendations, and gain greater exposure (Colicev *et al.*, 2017).

Increasingly, platforms are enhancing their positive impact on product performance by aggregating the number of reviews, displaying the number of reviews on their web pages to guide potential consumers to generate interest in the product and reduce the risk of purchase (Roselius *et al.*, 1971), in contrast, the Q&A section often appears as a supplement to the content of the review section and does not list the number of questions and answers, which has a very limited, and therefore the following hypothesis is proposed.

H1 Of the Q&A and review systems, only the volume of review systems has a positive effect on sales; the volume of Q&A sections does not affect sales.

WOM Richness

Previous research has found that rich information provides consumers with more functional, value-based information (Nguyen & Chaudhuri, 2018). This information about the experience can stimulate a sense of engagement and meaningfulness in consumers, leading to a higher degree of materiality, which makes it easier to make a purchase decision or other value-creating behavior (Bastos & Moore, 2021).In addition, length reflects the involvement of the reviewer, and when reviewer involvement

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[1] https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/the-consumer-decision-journey

https://www.the-future- of-commerce.com/2016/09/26/definition-consumer-journey/

is higher, other consumers can obtain more decision information from the reviewer (Pan & Zhang, 2011), and this useful information can help consumers in information filtering and even in following behavior (Aghakhani, 2020).

Consumer reviews and Q&A formats differ in the form in which content is presented. Generally, merchants encourage consumers to participate in reviews through monetary incentives or platform incentives but give fewer rewards for Q&A on goods, so reviews are both altruistic and self-serving, while answers in Q&A sections are more likely to be an altruistic act (Tellis *et al.*, 2019), a mechanism that leads to a certain number of false or invalid comments in review content, as opposed to Q&A section content, which is less useful in the minds of consumers. Therefore, the following hypothesis is proposed:

H2 WOM richness (length) has a positive impact on sales, with the length of ANSWERS having a greater impact than reviews

Topic consistency

According to information overload theory (Yang *et al.,* 2021; Luo *et al.*, 2013), the increased consistency between merchant responses and consumer review topics reduces the perceived information overload and increases consumers' motivation to process information. Besides, the ELM (Elaboration Likelihood Model) indicates consumers' motivation to process information determines their accuracy in processing information. That is, topic consistency improves the degree to which consumers process information about the content of a review, enabling them to more accurately grasp the true content (Guo & Zhou, 2016). Consumers' scrutiny of the product makes them more cautious about the decision-making process and more willing to refer to the negative reviews in which they criticize the product, thus making fewer purchases.

The consequent result is that consumer endorsement of negative information in review messages increases when the degree of consistency increases, as demonstrated by Herhausen (2019), who showed that linguistic style matching promotes (negative) word-of-mouth communication and Moore's (2017) study, which further demonstrates that linguistic imitation in forums reduces engagement behavior, especially in high-priced risk situations. Consumers process information more profoundly (Petty & Cacioppo, 2012), and negative information has a greater impact on consumers' decisions. Based on this, we propose hypothesis 3

H3 Review-Answer topic consistency shows a negative effect on sales

EMPIRICAL ANALYSIS

Sample and Data Sources

In the process of obtaining the data, the JD Mall e-commerce platform was selected as the sample source.[2] In JD, based on the classification of the webpage identified the retailing of refrigerators as the context of the study, this is because refrigerators, like large appliances, have a high risk of the purchase, and consumers tend to obtain more useful information to help complete the purchase behavior during the purchase process ((Tellis *et al.,* 2019). And the products are selected according to the following principles: a. have self-owned stores in JD platform; b. are listed companies. JD self-operated ensures uniformity of logistics and delivery, while corporate information of listed companies is more accessible (Kushwaha *et al.,* 2013).

Measurement

Number and length were measured with reference to existing literature, and the total number and length were counted separately. (Colicev *et al.,* 2017; Marchand *et al.,* 2017) Next, refer to Yang's (2021) method to measure the topic similarity. First, the JiebaR word splitting tool was applied to Chinese word splitting, and the top 50 keywords with the highest frequency in the comment section and the question and answer section for each product were extracted using the TF-IDF method, respectively, and then refer to Niwattanakul's (2013) study using Jaccard similarity method to calculate topic consistency. Regarding the measurement of sales, we use a logarithmic approach to the sales ranking to measure sales (Li *et al.,* 2020).

Analysis of Results

This paper adopts Stata 16.0 statistical software as the analysis tool, uses JD official backend data plug-in "business reference" for statistical analysis, uses Python and Excel tools for content processing, and uses general linear regression method to test the research hypothesis, and the OLS model is as follows:

$$ln\_rk = \beta_0 + \beta_1\ len\_rv + \beta_2\ len\_ans + \beta_3\ num\_rv + \beta_4\ num\_ans + \beta_5\ sim\_rv\_ans + \beta_6\ price + \varepsilon \qquad (1)$$

Where *len_rv* and *len_ans* represent the length of the comment and the length of the answer respectively; *num_rv* and *num _ans* respectively represent the number of comments and the number of answers; *sim_rv_ans* represents the similarity between comments and answers, reflecting the consistency of comments and answers. Besides, *price* is regarded as a control variable, β_0 is the constant term, ε is the error term.

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[2] https://www.jd.com/

According to Xia's (2014) conceptual framework, communication channels are divided into one-to-many and many-to-many forms of social aggregation, and we consider review systems as one-to-many and Q&A as many-to-many forms. To verify the difference in impact between the two, we measure content characteristics, i.e., content richness (length) and volume (volumn), variables that are considered to be important for value-creating behavior that can be measured and compared by textual analysis, and therefore reflect the differences in impact across social aggregation formats. We randomly selected 10 of the 20-star products (top ones) as a small sample set for our study, which was proved to be reliable in using a small sample as the prediction. (Colicev et al., 2017; Marchand et al., 2017; Aghakhani, N., 2018)

The ordinary linear regression was used to test whether there was a linear relationship between the number and length of comments in the comments and Q&A sections and the dependent variable. The results are shown in Table 1.

Table1: Preliminary Linear Regression Results.

ln_rk	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
len_rv	0.0257939	0.001545	16.7	0.000	0.0208776	0.0307101
len_ans	0.0589199	0.001145	51.48	0.000	0.0552774	0.0625624
num_rv	-9.00E-08	4.33E-07	-0.21	0.849	-1.47E-06	1.29E-06
num_ans	0.0000207	2.66E-05	0.78	0.493	-0.0000639	0.0001052
sim_rv_ans	-2.204909	0.422981	-5.21	0.014	-3.551024	-0.8587937
price	-0.0000976	1.53E-05	-6.4	0.008	-0.0001461	-0.000049
_cons	0.2237962	0.205854	1.09	0.357	-0.4313234	0.8789157

The results show that although different forms of social interaction have an impact on sales, the impact of the presented comment characteristics on sales varies, with the length of comments having a smaller impact on the logarithm of the ranking of sales (t=2.79, p=0.049) than the length of responses on the ranking of sales (t=8.74, p=0.001), and that not all characteristics of comments in the context of online shopping platforms were supported, and the length of questions, comments and the cumulative number of responses did not show a significant effect on sales. Overall, the two types of interactions presented by comments and Q&As had different effects on sales, with the length of answers having a greater effect on sales if the length of responses to both answers and comments was increased by one unit.

However, the results show that the number of reviews and Q&As does not have a significant effect on product sales, probably because product purchases belong to the decision stage when consumers are most motivated and capable of information processing and rely to a greater extent on diagnostic information, while quantity, an accessible piece of information, is less informative and therefore less dependent and has minimal impact on the direct impact of consumer decisions. (Colicev *et al*. 2017; Petty & Cacioppo 1986, 2012; Feldman & Lynch 1988).

We also conducted the word cloud picture of comments in Figure 3. We found that there was more abstract vocabulary in the keywords of the Q&A section, but the keywords in the review section, the words are the highlight with a high general meaning, which can psychologically satisfy consumers' need to know the details of the products. Therefore, although the topic consistency did show significant results in the above-mentioned study, if we future deepen the results and focus on more fine-grained levels (e.g., thought, meaning), we may be able to explore more new directions.

Review section   Answer Area
Figure 3: word cloud graphs of review section and Q&A section.

DISCUSSION AND CONCLUSIONS

To sum up, the OLS results prove that the difference did exist in the component area perspective. First, same as prior literature (Nguyen & Chaudhuri, 2018), the content richness has a positive effect on the outcome of the sales; besides, the Q&A section (vs. review section) indicates greater sales. Second, there is an interesting result as the topic consistency was proved to have a negative influence on the proxy of sales. Third, results show the number of reviews and answers cannot affect sales, and this could result from customers' caution of decision making (Tellis, 2019).

The study made contributions in academic and managerial aspects. First, it made comprehension of prior research on WOM richness (Nguyen & Chaudhuri, 2019) and review quantity (Marchand *et al*., 2017; Colicev *et al*., 2017) in affecting the sales. Second, both the ELM model(Petty & Cacioppo, 1986) and information overloading theory(Luo et al., 2013) are developed in this paper. Further, we prove the relationship between information selection and information source characteristics in the process of consumer decision-making, which provides a new perspective for WOM research. In managerial implication, previous studies about WOM in the micro-level mainly focused on the field of psychology and laboratory environment. We made up for the perspective of the actual purchase situation in the practical test (Packard & Berger,2020; Bastos & Moore,2021).

In addition, our study also has limitations. As a whole, this study uses a relatively small sample of appliance data collected from JD mall, and this might limit its external validity. Therefore, the findings should be generalized with caution. In a further study, we may utilize a higher quality sample containing more products and from a multi-platform. Based on the rich corpus of WOM, more micro-level research is expected to be taken. We believe that the breadth of WOM can be broadened in this case.

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