

The effect of negative online consumer reviews on product attitude: An information processing view

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Abstract

Online consumer reviews provide product information and recommendations from the customer perspective. This study investigates the effects of negative online consumer reviews on consumer product attitude. In particular, it examines the proportion and quality of negative online consumer reviews from the perspective of information processing. The elaboration likelihood model is used to explain the persuasive effect of the proportion and quality depending on product involvement. A high proportion of negative online consumer reviews elicits a conformity effect. As the proportion of negative online consumer reviews increases, high-involvement consumers tend to conform to the perspective of reviewers, depending on the quality of the negative online consumer reviews; in contrast, low-involvement consumers tend to conform to the perspective of reviewers regardless of the quality of the negative online consumer reviews. The experiment in this study uses 248 college students in Korea. The proposed hypotheses are tested by three-way analysis of covariance. © 2007 Elsevier B.V. All rights reserved.

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1. Introduction

The importance of word-of-mouth (WOM) communication is widely accepted in traditional marketing research. Many studies have shown that WOM communication affects consumer attitudes on a wide range of products and services such as innovations [44], and automobiles [48]. The WOM phenomenon has been transformed into various types of electronic WOM (eWOM) communications. For example, Epinions.com, which is an online opinion forum, encourages users to write reviews about products and services. In addition, various entertainment guides, such as Citysearch, display the user ratings of restaurants, bars, and shops [43]. The eWOM phenomenon has been changing people's behavior because of the growth of Internet usage. People often make offline decisions on the basis of online information; furthermore, they tend to rely

on the opinions of other consumers when making decisions about matters such as which movie to watch or what stocks to invest in [17]. The online market enables customers to write recommendations that influence potential consumers.

As with traditional WOM communications, online consumer reviews are important for driving the actions of consumers. However, online consumer reviews have different characteristics. First, unlike WOM communications, positive and negative online consumer reviews are simultaneously presented together from various sources at the same online place [9]. Although several scholars have compared the effects of positive and negative WOM communications in terms of strength [8,11,17,49] and speed of diffusion [13]. No consideration was given in those studies to the proportion of negative WOM communications.

Another characteristic of online consumer reviews is measurability. In the online consumer review context, consumers can easily observe and measure the quantity and quality of positive and negative opinions because online consumer reviews are published in a written form.

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Furthermore, the quantity and persistence of eWOM communications enables researchers to measure the extent to which online consumer reviews affect sales (particularly in terms of volume, valence, and dispersion) [12,18]. Dellarcas and Narayan [19] showed that the density of online ratings can serve as a useful indicator of the purchasing population's propensity to engage in post-purchase WOM communications. This study considered the quantity but not the quality of eWOM communications, though the quality of the argumentation can be a persuasive and influential factor [37,38]. In contrast to previous studies, we consider the effects of both quantity and quality under conditions where positive and negative online consumer reviews co-exist.

Although some researchers [9] have investigated the effect of negative eWOM communications, most eWOM studies focus on the usage of positive eWOM communications for a marketing mix [11] and on the motivation to read eWOM communications [12,18,22]. However, we focus on negative online consumer reviews because negative information is considered more diagnostic or informative than positive information [30]. For example, when consumers are exposed to negative information about a product, they can categorize the product as low in quality. In contrast, positive and neutral information about products is less useful for categorizing products because such information is commonly provided for high, average, and low-quality products [23]. Negative information may therefore be considered more useful or diagnostic for decision-making purposes and is consequently given greater weight than positive information. When the decision-making process is focused on the content of the message, such as the quality of information, negative framing is more effective than positive framing [30]. According to prospect theory, one experience of loss appears to be greater than the pleasure associated with gaining an amount equivalent to that which was lost because the value function is steeper for losses than for gains [25]. In this sense, a negative WOM message could have a stronger influence on a customer's brand evaluations [3,33,49] and purchase intentions than positive message [8,49].

Researchers are currently paying scant attention to how consumers use online consumer reviews to evaluate products in information processing perspective. Numerous studies have examined how advertising affects the way consumers evaluate persons, products, and issues. Social and consumer psychology, in particular, have adopted many approaches to examine the way people change their attitudes. In reviewing these approaches, we found the concept of involvement to be an important moderator with respect to the amount and type of information processing that is elicited by persuasive communication [38].

From the perspective of information processing, we used two online consumer review's variables, namely quality and proportion, to investigate how negative online consumer reviews affect consumer behavior. Our investigation focused on the following questions:

- (1) Does the product attitude become more unfavorable as the proportion of negative online consumer reviews increases?
- (2) Does the quality of negative online consumer reviews influence product attitude?
- (3) Does the quality of negative online consumer reviews affect high-involvement consumers more than low-involvement consumers?
- (4) Does the effect of the proportion of negative online consumer reviews vary in relation to the quality of the online consumer reviews and the level of consumer involvement?

2. Literature review and hypotheses

This research is based on the elaboration likelihood model (ELM) to explain the moderating effect of involvement on the proportion and quality of negative online consumer reviews. The conformity effect is also used to explain the persuasion impact of the proportion of negative online consumer reviews. This section of the article introduces the literature with two roles of online consumer reviews as a form of eWOM communication in a consumer's purchasing process. Based on the previous research, this study proposes five hypotheses.

2.1. Online consumer reviews as a form of eWOM communications

During the purchasing process, consumers want product attribute-value information and recommendations from various information sources. By acting as an informant and recommender, online consumer reviews have the capability of influencing the decision-making process of consumers. As an informant, online consumer reviews provide the type of product information that is similar to the information provided by sellers. However, online consumer reviews offer more consumer-oriented information, whereas sellers offer more product-oriented information such as product attributes, technical specifications, and performance results in relation to technical standards. On the other hand, online consumer reviews describe product attributes in terms of usage situations and measure the product performance from a user's perspective [6]. Online consumer reviews also provide additional attribute-value information that sellers are unwilling to mention or explain because of some limitation such as the limited space for a description.

As a recommender, online consumer reviews make recommendations about a product or a seller in a manner similar to traditional WOM communications [9,11]. However, online consumer reviews have several distinctive characteristics with regard to measurability, source, volume, and reachability [9,11]. The source of online consumer reviews is a group of anonymous Internet-savvy individuals who like to post online messages. There is a far greater

abundance of online consumer reviews than traditional reviews in the offline world. Furthermore, online consumer reviews are highly effective and can reach far beyond the local community through the Internet. online consumer reviews are also easy to observe and the number of people who recommend a product can be easily counted.

2.2. Conformity effect of the proportion of negative online consumer reviews

Burnkrant and Consineau [7] defined conformity as the tendency of opinions to establish a group norm and the tendency of individuals to comply with the group norm. Current consumer research defines conformity as a change in the product evaluations, purchase intentions, or purchase behavior of consumers as a result of exposure to the evaluations or purchase behavior of referents [27]. Conformity is influenced by group characteristics such as group size [45] and the proportion of others who have already acted [20]. An example of conformity can be seen when a consumer makes a decision on the basis of other peoples choices. It is because a large number of people making the same choice minimizes the perceived risk of regret after the purchase.

The pressure to conform comes from the influence of interpersonal information, particularly when an individual accepts information from others as evidence about the true qualities of a product [14,26]. The interpersonal nature of information in online consumer reviews could influence consumer attitudes. Existing research on conformity research indicates that the greater the number of people with the same opinion, the greater the level of conformity to that opinion. In other words, individuals are influenced by the majority of the group [20]. These studies show that the proportion of opinions from others may be a critical criterion for a consumer's choice. In this sense, the proportion of negative online consumer reviews could be an important factor for consumers who are considering whether to buy the new product because consumers can easily observe how many people have already bought the product and how many of them are satisfied with the product [9,11]. In the minds of consumers, an increase of just one negative online consumer review increases the riskiness of the product and decreases the desire for the product. Thus, a high proportion of negative online consumer reviews is more likely than a low proportion of negative online consumer reviews to induce a perception of purchasing risk.

Hypothesis 1 (The Negative Online Consumer Review Proportion Hypothesis). As the proportion of negative online consumer reviews increases, the product attitude becomes less favorable.

2.3. Quality of negative online consumer reviews

The Information Systems (IS) literature defines the quality of information in terms of its credibility, objectivity,

timeliness, understandability and sufficiency [5,31,34]. Marketing research on the quality of arguments focuses on effective persuasion. Strong messages that are objective and easy to understand are more effective than weak messages that are subjective and emotional [37,38].

Because of the diversity of online consumer review formats, the reviews range from simple recommendations with simple evaluative messages to attribute-specific comments with factual messages. Furthermore, in contrast to the information supplied by sellers, online consumer reviews have a consumer perspective and they help potential consumers make purchase decisions by supplying understandable, relevant, and believable recommendation with sufficient reasons.

We reviewed the quality of online consumer review content in terms of relevance, reliability, understandability, and sufficiency [5,32,37,38,49]. Relevance refers to the degree of congruence between the information that the consumer wants or requires to evaluate a product and the information contained in the online consumer reviews. Reliability refers to the dependability of the information [32]. Understandability refers to the degree of ease with which the information can be understood in the recommendation. Finally, sufficiency refers to the level of detail. High-quality online consumer reviews are persuasive because the information is relevant to evaluate the product and contains understandable, reliable, and sufficient reasoning. Low-quality online consumer reviews, on the other hand, are irrelevant, unreliable, and difficult to understand with insufficient reasoning [37,38]. The following text is an example of a high-quality review:

This product has very limited battery life. It didn't come with an AC power source. It also has no hold button, which means I have to take out the batteries when I'm not listening. Sometimes, it makes a really high pitched buzz in the earphones.

In the following example of a low-quality review, the nature of the content is quite different:

I got this product four weeks ago. I purchased it for my son for our trip to Disney. He loved it but after one week, he didn't play with it anymore. Hmmm... This product is not what he wants. Mistake! I shouldn't have chosen it.

The information in the low-quality example is not highly relevant or informative with respect to product evaluation, and it is difficult to understand why the reviewer does not recommend this product. Having specific and clear reasons, the high-quality reviews are more persuasive than the low-quality reviews. We suggest, therefore, that high-quality negative online consumer reviews may influence consumers more than low-quality negative online consumer reviews.

Hypothesis 2 (The Higher Quality Negative Online Consumer Review Hypothesis). As higher quality negative online consumer reviews increase, the attitude of consumers toward the product will become less favorable.

2.4. Moderating role of involvement

Recent research in consumer behavior and social psychology has focused on the way in which involvement moderates the amount and type of information processing elicited by persuasive communication [38]. This view stems from the elaboration likelihood model (ELM), one of the most significant new theories to emerge in consumer behavior over the past 20 years. This theory can help to explain the reaction of consumers to online consumer reviews by focusing on the information processing procedures that consumers follow in response to online consumer reviews. The ELM explains the processes that are responsible for changing attitudes and for enhancing the strength of attitudes. The likelihood of elaboration is influenced by the individual's motivation and ability to process information [38]. Motivation in this sense reflects a person's willingness and intention to process information [28].

The term involvement is popularly used to refer to personal relevance or importance [2,21]. Many authors have noted a strong relation between involvement and information processing [37,38]. As involvement increases, individuals have greater motivation to comprehend the salient information. They tend increasingly elaborate meanings during the comprehension stage of information processing. When involvement is low, however, individuals rely on peripheral cues from a stimulus such as source credibility, sympathy with the source, the number of arguments, the pictures included in the questionnaire, and the attractiveness of the pictures.

2.4.1. Involvement and the quality of negative online consumer reviews

Previous studies have consistently found an interaction between involvement and the quality of an argument [24,36]. A person who is a high elaboration (central routes) processor tends to think about most or all of the given information. Furthermore, when involvement is high rather than low, people are more motivated to devote the cognitive effort required to evaluate the true merits of an issue or product [38]. When the elaboration likelihood is low, however, the information is not thoroughly scrutinized; moreover, a change in attitude can result from fewer resource-demanding processes in which object-relevant information can be evaluated with a minimum of effort (peripheral route). In social psychology, the arguments in a message are thought to be more persuasive when involvement is high rather than low [37,38]. We therefore suggest that the quality of negative online consumer reviews influences a high-involvement consumer more than a low-involvement consumer.

Hypothesis 3 (The High-Involvement Consumers Hypothesis). Higher quality negative online consumer reviews influence high-involvement consumers more than low-involvement consumers.

2.4.2. Moderating role of involvement with the proportion and quality of negative online consumer reviews

Petty and Cacioppo [37] showed the quantitative effects of involvement. Under low involvement, as the number of arguments in a message increases, people agree with the message more strongly regardless of whether the arguments are cogent or specious. Under high involvement, the number of compelling arguments increases persuasiveness but the number of specious arguments does not increase persuasiveness. From that study, we deduce that, as the proportion of negative online consumer reviews increases, a low-involvement consumer is likely to have an unfavorable attitude even if the arguments are of a low-quality. On the other hand, we expect the effect of quality on a high involvement customer to be greater as the proportion of negative online consumer reviews increases.

Hypothesis 4 (The High-Involvement, High-Quality Negative Review Proportion Hypothesis). Under high-involvement, the effect of the proportion of negative online consumer reviews is greater for high-quality negative online consumer reviews than for low-quality negative online consumer reviews.

Hypothesis 5 (The Low-Involvement, High-Quality Negative Review Proportion Hypothesis). Under low-involvement, the effect of the proportion of high-quality negative online consumer reviews is the same as low-quality negative online consumer reviews.

3. Experiment

This study investigates the effect of negative online consumer reviews in terms of the proportion and quality of negative online consumer reviews and a consumer's product involvement. One experiment is conducted to test the proposed hypotheses. The proportion and quality of negative online reviews were expected to influence the product attitude, and involvement was expected to moderate the persuasive impacts of the proportion and quality of negative online consumer reviews.

3.1. Research methodology

This study used an experimental method, which was designed to examine how consumers process online consumer reviews. Subjects' involvement was manipulated into two levels (high and low). Through one focus group interview and one pretest, the total number of reviews was determined and the high- and low-quality of reviews were selected for this experiment. Potential confounding effects of variables were controlled in the main experiment.

3.1.1. Design and subjects

A 2 (involvement: low and high) \times 2 (the proportion of negative online consumer reviews: low and high) \times 2 (the quality of negative online consumer reviews: low and high) full factorial design was used to test the hypotheses. The subjects were 248 college students randomly assigned to

one of the conditions; we also gave each subject a gift. Most subjects had previously experienced online shopping (95.9%), and the mean of their online purchasing frequency at online shopping malls was eight times per month.

3.1.2. Online consumer reviews

A focus group interview was used to determine the total number of online consumer reviews for the main experiment. The subjects were asked to state how many online consumer reviews they considered to represent a few and many online consumer reviews. While surfing Internet shopping malls, the subjects generally read about six to eight reviews of about three or four lines each. As a result of the interview, we determined that eight was an appropriate number of online consumer reviews for this study.

Before the main experiment, we conducted a pretest to determine the quality of each online consumer review. We created 10 positive and 10 negative online consumer reviews on the basis of real online consumer reviews from online shopping malls. Each online consumer review included a title, the contents, and the reviewer’s name. The length of one online consumer review was set at about three lines to eliminate the effect of varying lengths because the length can affect the information quality and quantity [12]. One half of the positive and negative online consumer reviews was high-quality and the other half was low-quality. We asked 20 additional subjects who did not participate in the main experiment to evaluate the quality of the positive and negative online consumer reviews. Based on the results, the online consumer reviews were revised. To check the quality manipulation, we used modified items based on previous research [32]. The difference between high- and low-quality was significant. Table 1 shows examples of the online consumer reviews.

3.1.3. The experimental product and shopping mall website

Two criteria were used to choose a suitable product for testing our hypotheses with the subjects. First, we sought a product that appealed to our target customers, namely students, and the product had to have functions that the subjects could easily understand. Second, we wanted to choose a new product because we assumed that familiarity with existing products would cause the subjects to draw upon

their pre-knowledge and pre-evaluations about the product.

A new MP3 player with a digital multimedia broadcasting function was chosen for the experimental product. Most subjects had previously used an MP3 player (84.6%) and were knowledgeable about MP3 players (mean = 5.59). These results confirmed that our subjects were suitable target users of MP3 players and had a good understanding of the basic functions and characteristics of MP3 players.

We replicated the product information page of a real Internet shopping mall. The page showed a picture of the product and gave a brief explanation of its functions. We added some functions and eliminated some attributes on the basis of real product information. The online consumer reviews were located under the product information section of the website, as shown in Fig. 1.


3.1.4. Variables

In this experiment, the proportion and the quality of negative online consumer reviews were the independent variables and involvement was a moderating variable. The operational definition of the proportion of negative online consumer reviews was the ratio of the number of negative online consumer reviews to the total number of online consumer reviews. A high proportion of negative online consumer reviews was operationalized with four negative online consumer reviews among the total of eight online consumer reviews, whereas a low proportion of negative online consumer reviews was operationalized with two negative online consumer reviews. The quality of the online consumer reviews was assessed in terms of the quality of the information: namely, relevance, reliability, understandability, and sufficiency [5,32,37,38,49]. The high-quality online consumer reviews provided reliable product-relevant information, with an emphasis on understandability and a sufficiency of reasons. The low-quality reviews, on the other hand, provided irrelevant information which was difficult to understand and which lacked a sufficiency of reasons [37,38]. We maintained the quality of positive online consumer reviews at the same level by mixing high- and low-quality online consumer reviews.

We used a scenario-based approach for the involvement manipulation [29]. The scenario-based approach reduces

Table 1
Examples for negative online consumer reviews

Low-quality	High-quality
<i>Should have known better</i> Oh my goodness! – It was not a good choice. I bought this item new at this online store when it first came out. My overall satisfaction is very low. I should have known better than to buy this product. I don’t know why I chose it! Save your money and buy something else	<i>Not so great</i> This product has very limited battery life. It didn’t come with an AC power source. It also has no hold button, which means I have to take out the batteries when I’m not listening. Sometimes, it makes a really high pitched buzz in the earphones
<i>Not worth your money</i> I got this product four weeks ago. I purchased it for my son for our trip to Disney. He loved it but after one week, he didn’t play with it anymore. Hmmm. . . This product is not what he wants. Mistake! I shouldn’t have chosen it	<i>Watch out!</i> I am not satisfied with this product. It is simple but heavy to put around my neck. The sound of the built-in speakers spreads out and the sound is not that good. Because of the multi-functions, the buttons are complicated to use



MP3 Player

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Ships from and sold by J&R Music and Computer World.

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Product Information

Next Generation New MP3 Player!
Audio + Video + Real time TV
Easy electronic charging, High capacity, Different Feeling

Capacity: 1GB Audio: MP3, WMA, OGG, etc. Video: MPEG 1, MPEG2, MPEG4, WMV9 etc. Display: 2.4inch Color TFT LCD	Size: 80.5 X 52.0 X 16.5 mm Weight : 80g USB: USB 2.0 Battery : Lithium Polymer Built in
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Consumer Reviews

Better than previous mp3 player! **Julia**
Wow! It was a good choice. My previous mp3 player did not provide video. This product provides enough type of file formats, the 5.1 channel sound is great. I have used this for 5 days. No dissatisfaction. The screen is very clear. This product is very competitive.

Good **David**
It's good. On the video play, the screen size is manageable and the light intensity is controllable. The size is almost the same as credit card. I can continuously see the moving pictures at the point when I stopped before. It is great product.

Should have known better **Charlse**
Oh my goodness! -- It was not good choice. I bought this item new at this online store when it first came out. Overall satisfaction is very low. I should have known better this product. I don't know why I choose it! Save your money and buy anything else..

Fig. 1. The experimental shopping mall website.

the artificial setting commonly seen in other experiments [16]. Previous studies have indicated that involvement depends on the way individual consumers perceive the importance of various purchase situations. In line with the literature, we used two scenarios. For the high-involvement, the subjects were given the following scenario: “Your department, which has a limited budget, will distribute MP3 players to the students including you. You belong to a very small group of students at your university whose opinions about the product are being assessed” [30,38]. On the other hand, for the low-involvement condition, the subjects were given the following scenario: “Your department, which has a sufficient budget, will distribute MP3 players to freshmen not including you. You are part of a very large group of students at your department whose opinions about the product are being sought. Your opinion will be averaged with those of many other participants” [30,38]. Thus, the high-involvement stimuli have a greater effect than the low-involvement stimuli in encouraging subjects to read the website and to process the information more carefully.

The main dependent variable was the product attitude. The term attitude was used to refer to a reviewer’s overall evaluation of persons, objects, and issues [38,40]. Following the guidelines of Sternthal et al. [47], the product attitude was evaluated in relation to three items (bad–good, unsatisfactory–satisfactory, and unfavorable–favorable) with paired anchors.

Owing to the potential confounding effects of variables such as brand effect, prior product knowledge, and personal attitude towards online consumer reviews, we used multiple methods to control these effects and to improve the internal validity of the experiment. To eliminate brand effects, we hid the brand name. Moreover, we used prior product knowledge and personal attitude towards online consumer reviews as covariate variables. To control the prior product knowledge, one item was measured with anchors ranging from “I’ve never heard of MP3 player” to “I know MP3 player well” on a seven-point scale. The personal attitude for online consumer reviews was measured with three items on a seven-point scale (e.g., “When I buy a product online, I always read reviews that are presented on the website”, “when I buy a product online, the reviews presented on the website are helpful for my decision-making”, and “when I buy a product online, the reviews presented on the website make me confident in purchasing the product”).

3.1.5. Experimental procedures

Subjects were given booklets that contained a description of the experiment’s purpose and procedure. The booklets were premixed so that subjects were randomly assigned to the experimental treatments [29]. The procedure consisted of three parts. First, we explained the nature and contents of the experiment to the subjects. We also told them to continue the experiment at their own pace and to

raise their hands whenever they had any questions. Before the subjects entered the online shopping mall, they were informed of the involvement scenarios. The statement on the involvement scenarios was a variant of the procedure reported in the literature for manipulating the involvement of subjects with regard to the processing of message information [29,39]. Second, the virtual shopping mall site was provided for each subject. The shopping mall site contained the target product information, including a product picture and online consumer reviews. Finally, we asked each subject to fill in a questionnaire, which included manipulation checks, a dependent variable, and demographic information.

3.2. Results

3.2.1. Manipulation checks

To assess the manipulation of the proportion of negative online consumer reviews, two questions were asked about the overall recommendation and evaluation (Cronbach's alpha: 0.84), the outcome of which produced a significant difference in the perceived low proportion and high proportion of negative online consumer reviews ($M_{\text{Low Proportion}} = 3.60$, $M_{\text{High Proportion}} = 5.28$, $p < 0.001$). To check the manipulation of the quality of online consumer reviews, five items were evaluated (overall online consumer review quality, understandability, reliability, relevance to purchase decision, and sufficiency of reasons for the opinions) on the seven-point scale (1 = strongly disagree, 7 = strongly agree). These items were represented by single reliable factors for the quality of negative online consumer reviews (Cronbach's alpha: 0.84) and the quality of positive online consumer reviews (Cronbach's alpha: 0.83). The results of this assessment showed a significant difference ($p < 0.001$) between low-quality negative online consumer reviews and high-quality negative online consumer reviews but no significant difference with regard to the quality of positive online consumer reviews. Thus, the proportion and the quality of negative online consumer reviews were both successfully manipulated.

To test involvement manipulation, we used two kinds of tests. First, after borrowing the "self-reported cognitive effort" from existing ELM research [37–39], four items were asked "how much effort did you put into evaluating the product?", "how involved were you in this task?", "to what extent were you trying hard to evaluate the product?", and "how much effort did you put into evaluating the given information?" These items were represented by single reliable factors for involvement (Cronbach's alpha: 0.90). The measurements showed that the involvement manipulation was significant ($p < 0.001$). Second, the subjects were asked to try to recall the functions that were presented at the shopping mall [46]. For this question, we listed eight functions and asked the subjects to choose the correct functions provided by the website. The subjects in the high-involvement group significantly recalled more functions than those in the low-involvement group

($p < 0.01$). This result suggested that the high-involvement prompted extensive processing of online consumer reviews and product information. Thus, we confirmed the success of the manipulation of involvement.

3.2.2. Dependent variables

To test the hypotheses, we performed a three-way analysis of covariance (ANCOVA) test by using prior product knowledge and personal attitude towards online consumer reviews as covariates. The questions on personal attitude towards online consumer reviews were combined as one factor (Cronbach's alpha: 0.80). The results showed that the covariate effect of prior knowledge was not significant (prior knowledge: $F(1, 230) = 2.18$, n.s.) and that the effect of personal attitude towards online consumer reviews was not significant ($F(1, 230) = 1.18$, n.s.). The questions on the product attitude were also combined as one factor (Cronbach's alpha: 0.72).

Table 2 presents the mean and standard deviations of the dependent variable, and Table 3 presents a summary of the results. The main effect of the proportion of negative online consumer reviews was significant ($F(1, 230) = 52.56$, $p < 0.01$), which meant that subjects with a low proportion of negative online consumer reviews had more favorable attitudes than those with a high proportion of negative online consumer reviews. This suggests that the Negative Online Consumer Review Proportion Hypothesis (H1) should be accepted. The subjects who viewed the high-quality negative online consumer reviews said that the product was more unfavorable than those who viewed the low-quality negative online consumer reviews ($F(1, 230) = 21.71$, $p < 0.01$). This further suggests that the Higher Quality Negative Online Consumer Reviews Hypothesis (H2) should be accepted. On the other hand, the involvement \times quality interaction ($F(1, 230) = 11.18$, $p < 0.01$) revealed that the impact of quality on attitude was significantly greater under high rather than low involvement. So, we conclude that the High-Involvement Consumers Hypothesis (H3) should also be accepted.

The three-way interaction was significant ($F(1, 230) = 3.77$, $p < 0.05$). Furthermore, to explore the different effects of the proportion and quality of online consumer reviews under low and high involvement, we computed separate proportion \times quality ANOVAs (Table 4). Under high-involvement, the main effect of quality ($F(1, 111) = 33.39$, $p < 0.01$) was significant. The proportion \times quality interaction revealed that attitude became more unfavorable with an increase in high-quality negative online consumer reviews than with an increase in low-quality negative online consumer reviews ($F(1, 111) = 5.55$, $p < 0.05$, planned contrast: $p < 0.01$). Thus, we conclude that the High-Involvement, High-Quality Negative Review Proportion Hypothesis (H4) also should be accepted. Furthermore, there was no difference between the attitudes in a low proportion of the high-quality group and in a high proportion of the low-quality group (Fig. 2). This result also explained why several low-quality online consumer reviews had the same impact as

Table 2
Means, standard deviations of consumer product attitude

Involvement:	High-involvement				Low-involvement			
	High		Low		High		Low	
Proportion:								
Quality:	High	Low	High	Low	High	Low	High	Low
Means (standard deviations)	3.17 (0.80), <i>n</i> = 31	4.33 (0.85), <i>n</i> = 32	4.30 (0.64), <i>n</i> = 31	4.83 (0.89), <i>n</i> = 32	3.78 (0.68), <i>n</i> = 30	3.85 (1.05), <i>n</i> = 31	4.41 (0.81), <i>n</i> = 31	4.66 (0.82), <i>n</i> = 31

Table 3
Three-way ANCOVA test results

Variables	<i>F</i>
Involvement	0.01
Proportion	52.56***
Quality	21.71***
Involvement × proportion	0.23
Involvement × quality	11.18***
Proportion × quality	1.61
Involvement × proportion × quality	3.77**
Personal attitude toward reviews	1.18
Prior product knowledge	2.18

* *p* < 0.1; ** *p* < 0.5; *** *p* < 0.001.

one high-quality online consumer review for high-involvement consumers.

In contrast, under low-involvement, the main effect of quality ($F(1,117) = 0.89$, n.s.) was not significant. These results supported the ELM view that people under high-involvement were more influenced than people under low-involvement by the quality of information. Hence, under low-involvement (Fig. 3), attitude became less favorable with an increase in negative online customer reviews regardless of the quality of the negative online customer reviews ($F(1,117) = 0.25$, n.s., planned contrast: n.s.). Thus, we conclude that the Low-Involvement, High-Quality Negative Review Proportion Hypothesis (H5) also should be accepted.

As the proportion of high-quality negative online consumer review increased, a high-involvement consumer developed a much more unfavorable attitude than a low-involvement consumer (planned contrast, $p < 0.01$). However, as the proportion of low-quality negative online consumer reviews increased, the low-involvement and high-involvement consumers both developed unfavorable views with similar slopes (planned contrast, $p > 0.1$). This result differed from the results of previous ELM research

Table 4
Two-way ANCOVA test results of high-involvement and low-involvement

Variables	<i>F</i> -Value	
	High-involvement	Low-involvement
Proportion	31.28***	21.35***
Quality	33.39***	0.89
Proportion × quality	5.55**	0.25
Personal attitude toward reviews	1.33	0.18
Prior product knowledge	1.91	0.56

* *p* < 0.1; ** *p* < 0.5; *** *p* < 0.001.

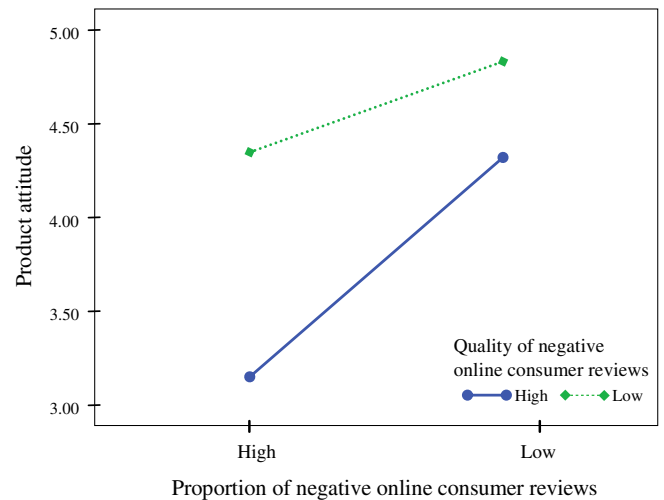


Fig. 2. High-involvement.

based on positive arguments [37,42]. Using positive arguments, the previous research showed that when the quality was low, the number of arguments affected only the low-involvement consumers and not the high-involvement consumers. A possible explanation for the difference between our result and those of previous studies could be the number of information sources. In the previous research, all the arguments came from a single information source, such as one seller or one advertisement; thus, the number of online consumer reviews was equal to the number of information

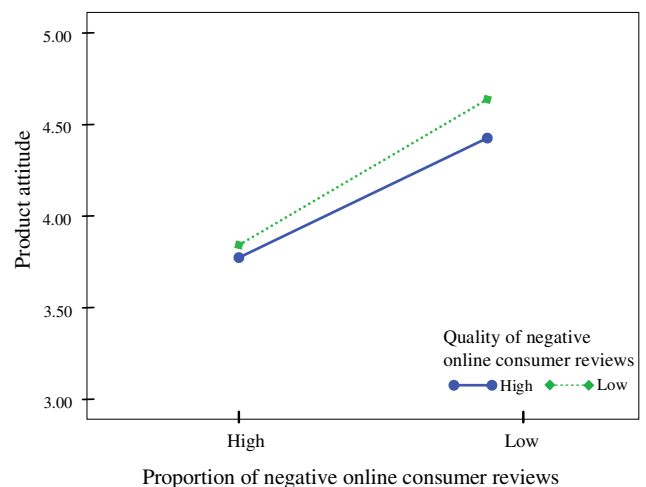


Fig. 3. Low-involvement.

sources. We deduce, therefore, that the number of recommenders could influence high-involvement customers regardless of whether the quality of online consumer reviews is low. In other words, as mentioned before, the online consumer reviews act as a recommender and as an informant. Quality is related more to the informant role, whereas proportion is related more to the recommender role. When the quality of a negative online consumer review is low, the impact of the informant role on high-involvement customers could be small. However, the recommender role remains and could influence the consumers unfavorably. Moreover, in contrast to positive information, negative information creates risk. Negative information is also more powerful than positive information e.g., [8]. Hence, low-quality negative recommendations could have a similar effect on high-involvement consumers as on low-involvement consumers.

4. Conclusion

The objective of this research is to investigate a consumer's information processing depending on the proportion and quality of negative online reviews and to find evidence to calibrate the extent of the moderating role of involvement. Our findings give both theoretical and practical contributions in several ways. The major results, contributions, limitations, and future research follow.

4.1. Summary of the results

We proposed several hypotheses and conducted an experiment to test these hypotheses. Four major findings emerge from this research. First, consumers conform to online consumer reviews and their attitudes become unfavorable as the proportion of negative online consumer reviews increases. Second, high-quality negative online consumer reviews influence consumer attitude more than low-quality negative online consumer reviews. Third, involvement interacts with the quality of negative online consumer reviews. That is, the degree of negative change in the attitude towards a product as a result of low-quality and high-quality negative online consumer reviews is greater for high-involvement consumers than for low-involvement consumers. Finally, this study reveals a three-way interaction of the proportion of negative online consumer reviews, the quality of negative online consumer reviews, and involvement. Under high-involvement, the conformity effect is greater with high-quality negative online consumer reviews than low-quality negative online consumer reviews. Under low-involvement, the conformity effect is not affected by the quality of negative online consumer reviews. When high-quality negative online consumer reviews increase, the attitude change under high-involvement is greater than under low-involvement conditions. In addition, our results show that the proportion of negative online consumer reviews could be a central cue to high-involvement consumers because of the recommen-

dation role of online consumer reviews. A simple negative recommendation (that is, a low-quality online consumer review) can influence the attitude of consumers under high-involvement condition as well as under low involvement condition.

4.2. Academic contribution

We have contributed to research on WOM communications by using the unique characteristics of eWOM communications in an online context. Due to the measurable characteristic of eWOM communications, we considered two online consumer review message variables: quality and proportion. Neither variable has been considered in previous WOM research. Hence, we can investigate the effect and interaction of these variables from the perspective of information processing.

While current online consumer review research focuses mainly on the effect of positive online consumer reviews, we used both positive and negative online consumer reviews to consider how negative online consumer reviews affect the product attitude. In a real online market, consumers can mention the bright side as well as the dark side of a target product. Thus, by using negative online consumer reviews, we can reflect the reality of the online market. As a result, this study deals with more realistic effects on consumer attitudes than previous studies.

This study applies and extends the ELM in several ways. First, both positive and negative aspects are applied to information processing. Sellers mainly show positive information in advertisements. Many ELM-based studies focus mainly on positive arguments and use the quality and quantity of the arguments. However, online consumer reviews generally contain positive and negative arguments. Therefore, the proportion of positive and negative arguments could be a relevant variable in extending the ELM to the online consumer review context.

Second, a distinction is made between the recommender and the informant. Because online consumer reviews act as an informant to provide additional product information, the effect of online consumer reviews can be explained by applying the ELM to consumer information processing. However, the recommender role causes consumers to conform to negative online consumer reviews regardless of the quality of the arguments. In other words, the proportion of negative online consumer reviews influences not only low-involvement consumers but also high-involvement consumers.

Third, this study has bridged different levels of information sources. While the messages in previous ELM research are derived from a single source, online consumer reviews are derived from a group of many sources. That is, quantity in online consumer reviews research refers to the number of recommendations whereas quantity in advertising research simply refers to the number of arguments. Our results show that ELM research can be applied to group-based information.

We have contributed to areas of both MIS and social theory. With respect to MIS research, our research results introduce a social theory of conformity. Conversely, by introducing the role of informant to the social theory of conforming, we have shown that the conformity effect can differ in relation to the information quality and the consumer involvement.

4.3. Practical contribution

Our results have business implications for sellers (or online mall managers). The major results emphasize the importance of managing negative online consumer reviews. Online consumer review management will be indispensable in the future because it benefits or hurts online sellers, depending on the online consumer review content. Furthermore, because negative online consumer reviews have a more powerful impact on product attitude than positive online consumer reviews, sellers should examine the quality and the number of negative online consumer reviews more closely than positive online consumer reviews. Sometimes the online consumer reviews are unhelpful and unreasonably negative, and the existence of such online consumer reviews negatively can influence the product attitude. Moreover, high-quality online consumer reviews are more influential than low-quality online consumer reviews in changing the attitudes for high-involvement consumers. Thus, the content of each online consumer review needs to be observed before the online consumer review is published. Amazon.com, for instance, has proposed participation guidelines in its help site, and Amazon reserves the right to restrict or remove any or all content at its sole discretion if it considers the content to be harmful to systems, other Amazon.com customers, or any third party. The guidelines for writing a general review at Amazon.com include details on what to include and what not to include; moreover, they prohibit “profanity, obscenities, or spiteful remarks” and state that any review in violation of these guidelines will not be posted. The guidelines on what not to include could be highly related to low-quality aspects such as arguments that are too subjective and unreasonable. We provide a rationale for this type of management. Unlike the case of traditional WOM communications, there is a possibility of controlling online consumer reviews possible because of their characteristics of observability and controllability.

Although a marketer cannot selectively filter negative online consumer reviews to manipulate their quality and quantity, the marketer can control how to show the online consumer reviews. On the basis of our results, we suggest two strategies for using the proportion as well as the quality of negative online consumer reviews. The first strategy is the first page strategy. As the number of online consumer reviews increases, only a limited number of online consumer reviews can be shown on one page. Shopping malls such as Amazon.com show three or four reviews on the first page and give links to all the customer reviews. Due to the primacy effect [4], posting of a negative online consumer

review as the first message may be unwise. The anchoring and adjustment hypothesis [1] also suggests that an initial positive online consumer review should be established as an anchor for subsequent evaluations. Consumers may then process the negative information in a somewhat biased manner; that is, under the influence of the initial favorable information and evaluation. If online consumer reviews are shown in chronological order, the system manager can control the number of reviews on the first page depending on how many positive reviews are included. Amazon gives the top placement for up to two high-quality positive spotlight reviews and then shows the other reviews below them. Therefore, the spotlight reviews could naturally control the proportion.

The second strategy is the online consumer review summary information strategy. This study offers rationales for the summary information on online consumer reviews, such as the proportion of positive online consumer reviews and the number of positive or negative online consumer reviews, because the summary information is useful for information processing and can influence the product attitude. Every website has its own way of showing online consumer review summaries. For example, Amazon shows only two kinds of review summaries: the average rating information and the total number of reviews (★★★★☆ (18 customer reviews)). Ebay.co.kr shows only the average rating (★★★★☆) on the first page. If a customer clicks the link, then the total number of reviews is shown. Ebay.com shows the feedback score with color summary information on the grade (1185 ★). If we click the information, we can then see more specific information icons in detail, such as the amount of positive feedback (%) and the number of positive and negative online consumer reviews. This study offers guidelines for determining how and which information a site should show. Gmarket.co.kr which is one of the most popular shopping mall provides no summary information of online consumer reviews. To avoid the effect of negative online consumer reviews, the site should not show the proportions of information. Moreover, we suggest interactive web page management, depending on the context of the product evaluation. For example, when a product has a high proportion of positive online consumer reviews, the system automatically emphasizes this information.

These strategies can be changed by the level of involvement. For example, a system can be developed easily to access online consumer reviews for high-involvement consumers. The system could also emphasize the review summary information for low-involvement consumers. Although the system cannot exactly determine the level of consumer involvement, it can detect involvement through click-stream data because online shopping tasks differ with the level of involvement. Browsing is characterized by its exploratory nature and the absence of planning, goals, or objectives [10,35], as opposed to searching, which is goal-directed and driven by a problem or a need for specific information [10]. According to the characteristics of click-stream

data, the searching task is close to high-involvement action whereas the browsing task is related to low-involvement action.

4.4. Limitations and future research

This study investigates how negative online consumer reviews have a negative effect on consumer attitude. Negative comments, however, have an interesting positive effect. Negative WOM communications are more credible than positive WOM communications [15]. In addition, a message that includes some negative information is generally considered more credible. We have not yet considered the credibility issue. The trade-off effect between the positive effect created by credibility and the negative effect created by criticism would be an interesting point to examine in future research.

When positive and negative online consumer reviews co-exist, the difference in the number of positive and negative online consumer reviews might influence the product attitude. For example, let us consider two cases of a fixed proportion of positive and negative online consumer reviews, where the total number is changed from small to large. In one case there are eight positive reviews and two negative reviews; in the second case, there are 80 positive reviews and 20 negative reviews. In spite of the same proportion, 80%, the effect is not the same. Thus, it would be an interesting research theme in the future to consider the effects of the proportion and the difference in numbers.

This study assumes that consumers only make either positive or negative recommendations. However, people can make neutral comments. Neutral comments using star ratings could be considered in future studies. In addition, firms can manipulate online consumer reviews by paying individuals to provide high ratings and the anonymity of the reviews is an added incentive to marketers, who can supply promotional reviews to influence consumer attitude and purchasing decisions. For this reason, the consumer may doubt positive online consumer reviews. Future research needs to focus on the effect of online consumer reviews in terms of consumer behavior from the context of fraudulent online consumer reviews.

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