Enhancing Buyers’ Perceptions of Product Quality: From Seller and Product Signals to eWOM

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ABSTRACT

Online transaction environment is full of uncertainties. To reduce online uncertainty, the first stage model examines the effect of extrinsic signals on perceived product quality, and the second stage model employs cue-diagnosticity framework to examine the influence of eWOM attributes (eWOM volume and eWOM consensus) on both perceived product quality and purchase intention. Our research questions are as follows,

1. Do IT-enabled solutions reduce uncertainty about sellers and products?
2. Do seller and product uncertainty affect buyers’ perceptions of product quality?
3. How do eWOM volume and eWOM consensus jointly influence buyers’ perceptions of product quality, and in turn their purchase intention?

To answer these questions, this study will conduct two experiments. The first will explore the research model from the perspective of IT-enabled solutions in a laboratory setting, and the second will validate the effect of eWOM on perceived product quality based on the findings of the first experiment.

Keywords (Required)
Perceived product quality, seller uncertainty, product uncertainty, eWOM, purchase intention, signaling theory, cue-diagnosticity framework, information asymmetry, third-party warranty

INTRODUCTION

Buyers use a variety of signals to infer product quality. These signals include extrinsic signals that are not related directly to product performance, and intrinsic signals that are derived directly from the physical product that, if changed, would change the product itself (Rao and Monroe, 1989). The more difficult it is for buyers to assess the quality of a product before purchase and the less they know about the seller selling the product, the more likely they are to rely on signals to form their expectation of quality (Gregg and Walczak, 2008). Thus, sellers try to use signals to reduce uncertainty and increase the perceived quality of their products, which in turn generates greater purchase intention. However, there is a physical separation between transaction parties in online markets, so intrinsic signals about the seller or product are unavailable. Buyers can only rely on extrinsic signals provided by websites.

The extant IS research identified various IT-enabled solutions, such as reputation systems (e.g., Dewally and Ederington, 2006), product description (e.g., Dimoka, Hong and Pavlou, 2012), and third-party warranties (e.g., Dewally and Ederington, 2006) to reduce seller and product uncertainty. These signals reveal the true characteristics of sellers or products but fail to convey the strong endorsement that stems from electronic word of mouth (abbreviated as eWOM hereafter) accumulated by the experiences of past buyers. This study aims to explore the effects of IT-enabled solutions that reduce uncertainty and eWOM endorsement on perceived product quality and buyers’ purchase intention.

The main purpose of this study is to determine whether seller uncertainty, product uncertainty, and eWOM significantly influence perceived product quality, and thus buyers’ purchase intention. Our research questions are as follows.

1. Do IT-enabled solutions (reputation systems, product description tools, and warranties) reduce uncertainty about sellers and products?
2. Do seller and product uncertainty affect buyers’ perceptions of product quality?

3. How do eWOM volume and eWOM consensus jointly influence buyers’ perceptions of product quality, and in turn their purchase intention?

To answer these questions, this study will conduct two experiments. The first will explore the research model from the perspective of IT-enabled solutions in a laboratory setting, and the second will validate the effect of eWOM on perceived product quality based on the findings of the first experiment. The first experiment will allow us to identify the control variables for the second laboratory setting and to explore the characteristics of eWOM on buyers’ perceptions of product quality and their purchase intention.

In presenting the theoretical foundation and hypotheses of the study, we highlight the effects of IT-enabled solutions on buyers’ evaluation of product quality and the endorsement effects of eWOM on perceived product quality and purchase intention.

LITERATURE REVIEW

This literature review first elaborates on signaling theory and the effective signals that help buyers reduce uncertainty about transactions. The effects of seller uncertainty and product uncertainty on perceived product quality are then hypothesized (H2 and H3). Hypotheses are also made about the factors that mitigate seller uncertainty and product uncertainty (H3-H5). The theoretical concept that applies to the relationships among eWOM attributes (volume and consensus), perceived product quality, and purchase intention – the cue-diagnosticity framework – is then discussed, and thus hypotheses are also made (H6-H9).

Signaling Theory

Buying experience goods online is a risky behavior, there is a high degree of pre-purchase information scarcity and post-purchase information clarity about experience goods in online marketing channels. One possible solution to this problem is the use of signals to convey credible information about unobservable product quality to buyers (Rao, Qu and Ruekert, 1999). Quality signals are useful to resolve the problem of adverse selection due to information asymmetry (Kirimani and Rao, 2000). Efficacious signals have two important characteristics: signal observability and signal cost (Connelly, Certo, Ireland and Reutzel, 2011). Signal observability refers to the extent to which outsiders notice the signal, and signal cost refers to the need for costs to be structured in such a way that dishonest signals do not pay. Differential cost is most important property of information signals because if the signal is false, then the seller incurs a monetary loss, and thus a claim about unobservable quality is likely to be true. Signals that satisfy these two properties may help buyers to distinguish among sellers and products.

Seller Uncertainty

Seller uncertainty is a buyer’s difficulty in assessing the seller’s true characteristics and in predicting whether the seller will act opportunistically (Dimoka et al., 2012). A seller’s unwillingness to disclose his or her true characteristics leads to seller uncertainty. The limited Web interface of online markets exacerbates seller uncertainty (Gefen, Karahanna and Straub, 2003). Seller uncertainty in online markets is reduced through ratings of seller reputation. The collective ratings of seller reputation provide buyers with a shortcut reference check on the seller, which controls their fear of seller uncertainty. Accordingly, a seller reputation system would contribute to the selection of credible sellers.

Product Uncertainty

Product uncertainty is a buyer’s difficulty in assessing a product’s characteristics and predicting how the product will perform in the future (Dimoka et al., 2012). Product uncertainty arises either from the seller’s inability to describe the product online (description uncertainty) or the seller’s unawareness of the true product condition and future performance (performance uncertainty) (Dimoka et al., 2012). The difficulty in inferring product quality forces buyers to underestimate the product quality.

Relationship between Seller Uncertainty and Perceived Product Quality

This study focuses on seller uncertainty resulting from adverse seller selection, because adverse seller selection is a prepurchase problem and can be resolved by signals. We argue that seller uncertainty resulting from adverse selection is likely to impede perceived product quality. We thus propose the following hypothesis.
H1: Seller uncertainty is negatively associated with perceived product quality.

**Relationship between Product Uncertainty and Perceived Product Quality**

Product uncertainty is also expected to have a negative effect on perceived product quality. A high product uncertainty implies that buyers are more likely to incur a loss after purchase. As people are generally risk averse in the domain of losses, buyers are likely to overestimate the probability of a loss (Kahneman and Tversky, 1979), and thus evaluate a product with a high uncertainty as being of low quality. Product uncertainty refers to uncertainty about the product description or product performance (Dimoka et al., 2012). If buyers have difficulty in assessing the product description, then they will compensate for the description uncertainty by lowering their perception of the product quality. Fears that product performance will not be as expected will also lead buyers to lower their perceptions of product quality. We thus propose the following hypothesis.

H2: Product uncertainty (description and performance) is negatively associated with perceived product quality.

**Perceived Product Quality**

Perceived product quality is the sum of the differences between the quality perception and quality expectation of a product’s characteristics (Jun and Jolibert, 1983). The quality expectation stems from a norm developed from the average performance of products with similar characteristics through marketing channels. The quality perception is a buyer’s assessment of a given product before purchase. As people facing losses are generally risk averse, the quality perception is usually underestimated and is close to or below the quality expectation, which lowers the perceived product quality. A decrease in uncertainty not only lessens the fear of losses but also increases the difference between the quality perception and quality expectation. Accordingly, reducing description and performance uncertainty in online marketing channels is likely to improve the perceived product quality.

**Signals to Reduce Uncertainty**

Efficacious signals are those that restrain adverse seller selection and increase a seller’s ability to delineate the product characteristics and product performance, respectively. The following subsections explain the significant signals that reduce seller and product uncertainty about perceived product quality.

**Seller uncertainty**

To alleviate seller uncertainty, online buyers use the information contained in the seller’s reputation profile to examine their expected utility from the transaction (Ghose, 2009). Reputation systems are designed to publicize buyers’ transaction experiences with sellers through the posting of comments and the rating of the quality of service provided by the seller (Ba and Pavlou, 2002). Sellers with a long and unblemished rating profile are less likely to destroy their good name to take advantage of a single transaction. Accordingly, reputation systems help to build trust and minimize risk, thereby minimizing the adverse selection effect. We thus propose the following hypothesis.

H3: Reputation systems are negatively associated with seller uncertainty.

**Description uncertainty**

Description uncertainty arises from a seller’s inability to describe a product online. Jiang and Benbasat (2004) set out the diagnosticity of online product descriptions that captures the degree to which a seller is able to offer diagnostic descriptions in the form of visual control and functional control descriptors through the Internet interface. Dimoka et al. (2012) extend the visual control descriptors to three IT-enabled solutions – textual descriptions, visual images, and multimedia tools – and examine the extent to which they enhance sellers’ ability to describe their products. The findings indicate that textual and visual product descriptions are relatively effective in mitigating product uncertainty, but that textual product descriptions are costless (Jin and Kato, 2006). Accordingly, this study focuses on the visual product descriptions.

Individuals tend to pay more for a product with a picture in online auction markets, as the picture confers on the product a high perceived quality (Kauffman and Wood, 2006). The failure to provide an image of a product casts doubt on the product quality (Dewally and Ederrington, 2006).

Sellers of bad products are unlikely to show many detailed pictures that may reveal imperfections and thus create a legal basis for product misrepresentation if the delivered product differs from its visual description. Accordingly, visual product descriptions are proposed to reduce buyers’ product uncertainty.

H4: Visual product descriptions are negatively associated with product uncertainty.
Performance uncertainty

Performance uncertainty results from a seller’s unawareness of the true product characteristics and future performance, and prevents buyers from predicting the product’s future performance. Product assurance by third parties is an efficacious signal that offers buyers expert information on a product’s true characteristics and its future performance. There are three third-party tools that offer product assurance: inspection, history reports, and warranties (Dimoka et al., 2012). Inspection and history reports, which incur a cost to sellers, are relatively useful tools for high-price used products, such as used cars. For new and moderately priced products in online markets, such as digital cameras, warranties offered by credible third parties offer a reasonable assurance to buyers. Warranties generally signal a high product quality because they certify that the product will adhere to certain performance standards, and the cost of rectifying each claim is transferred to the seller (Murthy and Djamaludin, 2002). Thus, warranties are proposed to reduce buyers’ product uncertainty.

H5: Warranties are negatively associated with product uncertainty.

Cue-diagnosticity Framework

Buyers often use multiple cues to judge target quality when making a purchase decision. The cue utility framework suggests that cue utility varies with the diagnostic and predictive ability of the cue in relation to the target quality (Slovic and Lichten, 1971). The cue-diagnosticity framework is based on the cue utility theory, which holds that most buyers’ choices or decisions are based on multiple attributes that buyers combine to make an accurate decision. In the context of marketing, the cue-diagnosticity framework views product quality evaluation as a process that results in a higher possibility of a product being distributed to a particular product category rather than another. Cues that result in a target being distributed to an accurate product category are viewed as being more diagnostic. The more diagnostic a cue, the greater the possibility that it will be used to assess product quality (Dick, Chakravarti and Behal, 1990). Different types of cues have different effects. This study introduces two cue types – high-scope cues and low-scope cues.

High-scope Cues versus Low-scope Cues

Cues can be categorized into high-scope cues and low-scope cues (Gidron, Koehler and Tversky, 1993). This classification accords with two principles: how cues change over time and how those changes influence buyers’ product perceptions (Purohit and Srivastava, 2001). High-scope cues evolve over time but their valence cannot be changed immediately, because their valence change requires considerable effort. Thus, high-scope cues are considered to be more reliable and diagnostic than low-scope cues. Brand name and firm reputation are examples of high-scope cues. In contrast, low-scope cues are temporal, and their valence can be changed easily and quickly. Price change and product warranty are examples of low-scope cues. Low-scope cues are regarded as less diagnostic to accurately assess product quality (Hoch and Deighton, 1989). However, low-scope cues may still be effective in judging product quality when relatively high-scope cues are available. For example, if a firm has a positive high-scope cue such as firm reputation, a buyer will be more willing to use low-scope cues such as product warranty to assess the product quality. In contrast, if the high-scope cue is not present, then the diagnostic value of the low-scope cue is poor. In sum, there are two routes to evaluating product quality from cues: the direct effect through high-scope cues and the indirect effect through low-scope cues. This study investigates the issue of eWOM cues, including eWOM volume, eWOM consensus, and the valence of eWOM.

Positive eWOM valence

Positive eWOM messages have been shown to be an effective means of boosting products’ standing, and they interest sellers due to direct impact on sales volume. Thus, the purpose of this study is to examine the joint effects of positive eWOM volume and consensus on perceptions of product quality, and in turn their influence on buyer’s purchase intention.

eWOM volume as a high-scope cue

eWOM in the form of online buyer reviews is believed to remarkably influence buyer purchasing decisions. Online buyer reviews can influence buyers’ decision through two aspects: informants and recommenders (Park, Lee and Han, 2007). Informants provide additional user-generated information that goes beyond the retailer’s marketing advertisements. Recommenders provide positive or negative information about a product’s popularity. These two aspects can reduce product uncertainty for buyers’ (Bickart and Schindler, 2002). Thus, eWOM has the same influence as online buyer reviews.

Numerical information represents the popularity of a product and mass trends that cannot be ignored (Baker and Petty, 1994). Given the bandwagon effect, popularity also implies correctness, which has a strong persuasive effect on buyers’ decision making (Salganik and Watts, 2008). Similarly, in the eWOM context, a high volume of buyers’ opinion is more influential...
and powerful than a low volume of opinion because it signals the product’s popularity. Thus, eWOM volume can be regarded as a high-scope cue.

**eWOM consensus as a low-scope cue**

Consensus refers to the level of agreement between two parties in response to a stimulus on a specific occasion (Kelley, 1967). If one party’s opinion is similar to the other, then the consensus between them is high. Conversely, if two parties have different opinions and cannot reach agreement, then their consensus is low. According to attribution theory, an individual’s decision is influenced by the level of consensus in describing the response to a stimulus (Kelley, 1967). Thus, consensus information plays an important role in buyers’ decision making.

eWOM consensus is the extent to which people’s opinions about a target are similar to those of other eWOM providers (West and Broniarczyk, 1998). The greater the consensus across eWOM providers, the more persuasive the positive eWOM message. eWOM consensus is a subsidiary cue that depends on the presence of eWOM volume. The presence of conflicting opinions (i.e., low consensus) among eWOM providers decreases the credibility and diagnosticity of eWOM (Qiu, Pang and Lim, 2012).

**Effect of eWOM Volume and eWOM Consensus on Perceived Product Quality**

**eWOM volume**

Positive eWOM volume is a high-scope cue that directly influences buyers’ decisions about product quality. According to the cue-diagnosticity framework, eWOM volume is a high-scope cue, so its diagnosticity is relatively independent of the valance of other cues. This implies that the quality of a product will be better perceived with a high positive eWOM volume than a low positive eWOM volume.

H6: Buyers perceive the product quality to be superior when the product has a high positive eWOM volume than when it has a low positive eWOM volume.

**eWOM consensus**

The low-scope cue eWOM consensus is diagnostic when the valence of the high-scope cue (eWOM volume) is positive but not when it is negative. Thus, a greater eWOM consensus can affect product quality perceptions when it is supported by a high volume of eWOM. Consistent with the cue-diagnosticity framework, Khare, Labrecque and Asare (2011) posit that a high eWOM consensus leads to better perceptions of quality when a product has a high eWOM volume. We thus draw the following hypotheses.

H7: When the eWOM volume is high, a high consensus of positive eWOM messages leads the buyer to believe the product to have superior quality. When the eWOM volume is low, consensus has no effect on perceptions of product quality.

H8: When the eWOM volume is high, a low consensus of positive eWOM messages does not lead the buyer to believe the product to have superior quality. When the eWOM volume is low, consensus has no effect on perceptions of product quality.

**Relationship between Perceived Product Quality and Buyers’ Purchase Intention**

Perceived product quality refers to product evaluations based on product attributes that are objectively measurable. Buyers’ purchase intention is influenced by buyers’ evaluation of product quality. That is, if buyers perceive a product to have a high value, then they will have strong intention to buy it. Using the belief-attitude-intention framework as a foundation, this study posits that positive eWOM messages intensify buyers’ inner belief about and positive attitude toward product quality, which in turn influences their purchase intention. We thus posit the following hypothesis.

H9: Buyers’ perceptions of product quality positively influence their purchase intention.

**RESEARCH DESIGN**

The proposed research will comprise two stages. The first stage will involve a laboratory experiment to investigate the effect of signals in improving buyers’ perceptions of product quality by reducing seller uncertainty and product uncertainty. The findings of the first stage will be employed to configure an online store. The second stage will examine the effect of eWOM on perceived product quality, and in turn how this influences buyers’ purchase intention. The following sections present the research method for each stage.
Stage 1: Lab Experiment

The first stage of the study will investigate whether reputation systems, visual product descriptions, and warranties reduce seller and product uncertainty, and in turn improve buyers’ perceptions of product quality. Figure 1 shows the conceptual model.

![Figure 1. Research conceptual model (Stage 1)](image)

Subjects

The subjects in Stage 1 will be 240 undergraduate students (20 for each treatment) with Internet shopping experience.

Experimental design

The experiment will adopt a completely randomized 3 (reputation system: binary /component /binary and component) x 2 (visual product description: no picture/pictures) x 2 (warranty: free replacement/pro-rata) between-subjects factorial design.

Treatment: reputation system

The reputation system design draws on Taobao’s reputation system. We will only employ a positive rating in reputation systems to examine the effect on seller uncertainty.

Treatment: visual product description

Subjects will be exposed to one of two conditions: no picture (control group) or a picture that demonstrates the product characteristics (i.e., three pictures of a digital camera).

Treatment: warranty

The warranty design draws on that of Murthy and Djamaludin (2002), which includes two typical levels of warranty policy: a free replacement warranty and a pro-rata warranty.

Experiment procedure

The study will be administrated in a controlled laboratory. All of the subjects will be asked to imagine that they need to buy a digital camera and that the online store is specialized for such products. They will then be directed to an online experimental site. The cover page will randomly display links to twelve versions of the seller and product information and the related questionnaire, one at a time. The subjects will be assigned to different experimental conditions and will then complete the relevant dependent measures.
Measurement

The items to measure seller uncertainty, product uncertainty, and perceived product quality will be adopted from previous research. In the end, the participants will be asked to fill out a short background questionnaire to control confounding effect on perceived product quality.

Manipulation checks: treatment recall

The subjects will be asked to list any treatments that they remember seeing in the online store. The order in which they list the treatments will be used as the measure of early recall.

Data Analysis

The method suggested by Baron and Kenny (1986) will be used to test the mediation hypothesis. Three analysis of covariance (ANCOVA) models with product involvement as the covariate will be examined.

Stage 2: Lab Experiment

Based on the preceding review, we propose the research model in Figure 2. Buyers’ purchase intention will be the dependent variable. The independent variables will include eWOM volume, manipulated as either high or low, and eWOM consensus, again manipulated as either high or low. Perceived product quality is positioned as a mediator of the relationships between the independent variables and the dependent variable.

Subjects

Stage 2 will use the online store webpage designed and validated in Stage 1. The subjects will be recruited from among the members of several bulletin board systems, and the topic of which is consumer electronic product shopping.

Experiment design

The experiment will have a 2 (eWOM volume: low/high) x 2 (eWOM consensus: low/high) between-subjects factorial design. The subjects will be randomly assigned to one of the four conditions. After the subjects have been exposed to the manipulated eWOM messages, they will be asked to answer a perceived product quality and purchase intention questionnaire.

Experiment procedure

The experiment stimuli information will be displayed on the webpage. The first page will introduce an online store that sells various types of consumer electronic products, such as cameras. The eWOM volume and eWOM consensus information on the focal camera will be provided on the next page. The camera brand will be concealed to prevent experimental bias. The subjects will be exposed to either a low or a high volume of eWOM messages. In addition, some of the subjects will also be exposed to one of two levels of eWOM consensus stimuli (low versus high) on the same page. After reading the eWOM messages, the subjects will be instructed to answer the questionnaire about their product quality perception and purchase intention.
Treatment: eWOM volume
Participants in the high (low) volume conditions will read that the average star ratings are based on individual ratings from 1,000 (50) buyers.

Treatment: eWOM consensus
Borrowing from West and Broniarczyk’s (1998) work, consensus will be manipulated by varying the percentages of the 1-, 2-, 3-, 4-, and 5-star ratings.

Measurement
Items to measure purchase intention and perceived product quality will adopt from Meyers-Levy and Peracchio (1996), and Purohit and Srivastava (2001), respectively.

Data analysis
ANOVA will be performed to summarize and test the interaction effect of eWOM volume and consensus on perceived product quality and purchase intention.

EXPECTED CONTRIBUTIONS
This study incorporates the costly signals delivered by seller, which reduce uncertainties of sellers and products, and diagnostic cues from eWOM, which create effect of endorsement, to advance our theoretical and pragmatic understanding in the efficacious approaches to relieve consumers’ concern on experience good, and which in turn will enhance consumers’ purchase intention.

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