

THE FORMATION OF SOCIAL INFLUENCE IN ONLINE RECOMMENDATION SYSTEMS: A STUDY OF USER REVIEWS ON AMAZON.COM

Completed Research Paper

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Abstract

Thanks to Web 2.0, retail websites and online communities provide user reviews to help consumers make purchase decisions. Current IS and marketing literature reveal that user reviews can form strong social influence on consumers' purchase decisions. However, few studies systematically examined how social influence is developed from user reviews. To bridge the gap, our research explores what factors impact the formation of social influence from user reviews. Based on a survey conducted in a controlled lab environment, the results suggest that review quality positively impacts informational influence while review consistency negatively impacts informational influence. Review consistency and social presence positively impact value-expressive influence. We also incorporate product expertise and self-monitoring as moderators into the model. Interestingly, product expertise weakens the relationship between social presence and informational influence. Self-monitoring does not impact value-expressive influence in online settings. Managerial implications are discussed.

Keywords: Web 2.0, user reviews, social influence, system design, E-Commerce

Introduction

Web 2.0 is changing the design of retail websites, and thus, the way people use these websites for making purchase decisions. An increasing number of online retail websites (e.g., Amazon, eBay) have implemented Web 2.0 technology that integrates user-generated recommendations with system-generated product information for consumers. In addition to these transaction-based websites, there are a growing number of third-party online communities that offer online user reviews on physical products (shopping.com), restaurants (zagat.com), hotels (tripadvisor.com), etc. Both retail websites and online communities allow ordinary consumers to share opinions on a product using numerical star ratings and open-ended comments, followed by system-generated product description. In addition to ratings and reviews, the system collects reviewers' profile and past contributions, and displays the helpfulness of reviews for consumers to evaluate reviews and reviewers. In this regard, we refer to *user reviews* as user-generated recommendations that include product star ratings, text-based reviews, and all the system features that allow consumers to know more about the reviewers.

User reviews play an increasingly important role in E-commerce nowadays. Consumers are able to easily and freely access information on products and services with tremendous efficiency and flexibility (Dellarocas 2003; Duan et al. 2008). More and more consumers are relying on user reviews for making purchasing decisions (Riller 1999; Zhu and Zhang 2010). A survey by comScore (2007) found those who used an online review, 41 percent of restaurant consumers subsequently visited the restaurant recommended by reviewers, and 40 percent of hotel consumers subsequently stayed at a recommended hotel after reading reviews (comScore 2007). Duan et al. (2008) reported that the movie *The Blair Witch Project* (1999) with a small production budget of \$60,000 eventually became a huge box office success (\$248 million worldwide), as a result of the large-scale online discussions.

Recently, the topic of online user reviews has attracted more and more research interest by both marketing and IS scholars from diverse perspectives. From the marketing perspective, researchers focus on the impact of online user reviews on product sales (e.g., book or movie) (Chen et al. 2004, 2008; Chevalier and Mayzlin 2006; Dellarocas et al. 2007; Duan et al., 2008; Duan et al. 2009), marketing strategy (Chen and Xie 2005, 2008; Dellarocas 2006; Zhu and Zhang 2010), consumers' purchase decisions (Chevalier and Mayzlin 2006), etc. From the IS perspective, online user reviews have been shown to positively influence online information search (Smith et al., 2005; Weiss et al., 2008), trust development (Ba and Pavlou, 2002; Pavlou and Gefen 2004), decision-making process and system evaluation (Kumar and Benbasat 2006; Mudambi and Schuff 2010).

In spite of a great amount of research efforts, we are still facing some confusing results. First, studies focusing on the relationship between user reviews and product sales seem to have mixed results (Duan et al. 2009). Some studies found a significant impact of user reviews on sales (Chen et al. 2008; Chevalier and Mayzlin 2006), while others did not (Chen et al. 2004; Godes and Mayzlin 2004). Second, although consumers are more likely to trust online user reviews than other sources of product information (e.g., marketer-generated) (Bickart and Schindler 2001; Smith et al. 2005), the influence of user reviews may be exerted to a very limited extent (Jepsen 2006).

We believe that these mixed results may come from the fact that most studies treat user reviews as exogenous and take them for granted. Researchers did not consider explicitly how the characteristics of user reviews influence consumers' perceptions about the user reviews. Since online user reviews are playing an increasingly important role in making purchase decisions (Chen and Xie 2008; Chevalier and Mayzlin 2006), in order to open the black box, it is critical for us to understand how user reviews influence consumers during the decision-making process.

Based on an extensive review on the marketing and IS research, we argue that user reviews can form strong social influence on consumers' purchase decisions. Burnkrant and Cousineau (1975: p.208) supported that "when a person is placed in a product evaluation situation in which he is unable to adequately assess the characteristics of the product from direct observation and contact, he will view the reactions of others as evidence about the 'true' nature of the product". However, research on the types and sources of social influence in online recommendation systems is limited. To the best of our knowledge, grounded on Social Influence Theory (Kelman 1961, 2006), this study is one of the first IS studies to explicitly differentiate different kinds of social influence and explore their sources. This study intends to

enrich our understanding on how social influence is developed from user reviews. In addition, we take into account individual differences in the formation of social influence. The specific research questions are:

1. How are different types of social influence developed from user reviews?
2. How do individual differences play a role in the formation of social influence from user reviews?

Theoretical Background

Social Influence Theory (SIT)

The Social Influence Theory (SIT), developed by Kelman (1961, 2006) is the classic socio-psychological theory that explains how an individual is influenced by others. Generally speaking, SIT posits that changes in attitudes and actions are produced by social influence at different levels. According to Kelman (1961: 62-66), there are three processes of social influence. Compliance can be said to occur when an individual accepts influence from another person or from a group because he hopes to achieve a favorable reaction from them. Identification occurs when an individual accepts influence because he wants to establish or maintain a satisfying self-defining relationship to another person or a group. Identification may take the form of taking over the role of the influencing agent, being involved in a reciprocal relationship, or maintaining his relationship to a reference group. Internalization occurs when an individual accepts influence because the content of the induced behavior is intrinsically rewarding. The individual adopts the influence because he finds it useful for the solution and perceives it as inherently conducive to the maximization of his values. Compliance and identification are similar in that the individual does not adopt the induced behavior because its content is intrinsically satisfying (as in internalization). The difference is that in identification, the individual actually believes in the opinions and actions that he adopts. In contrast, in internalization, the induced behavior is integrated into a personal system, independent of the external source.

Based on the three processes of social influence, marketing researchers identified three main types of influence during the purchase process (Bearden et al, 1989; Burnkrant and Cousineau, 1975; Deutsch and Gera, 1955; Park and Lessig 1977). A normative/utilitarian influence is formed through compliance if an individual is motivated to realize a reward or avoid a punishment mediated by another. A value-expressive influence is formed through identification when an individual is motivated to enhance his self-concept, by associating himself with positive referents and/or dissociate himself from negative referents. An informational influence is accomplished through internalization if it is perceived as being instrumental to the solution of a problem and enhancing an individual's knowledge or his ability to cope with his environment (e.g., purchasing a product).

Social Influence Theory (SIT) in the IS studies

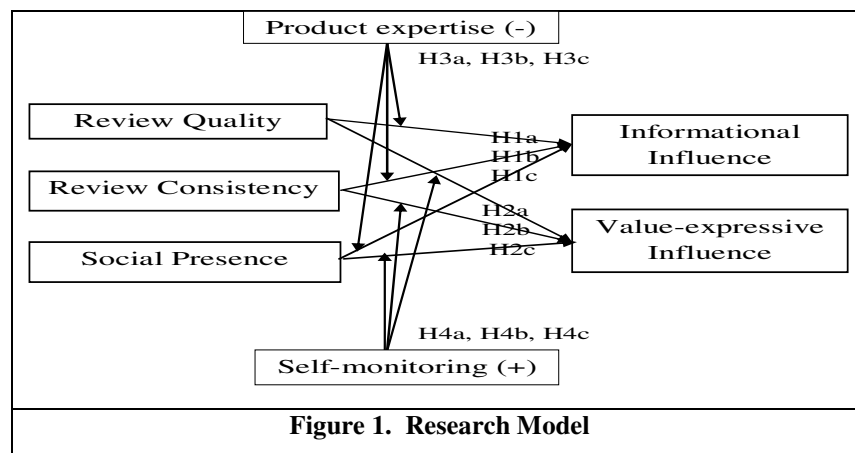
In the IS field, SIT is applied to understand how social influence from external sources affects an individual's intention to adopt or use a system (Venkatesh and Davis 2000). One of the most representative applications is the TAM2 model, which integrates TAM and SIT (Venkatesh and Davis 2000). In TAM2, *compliance* occurs in the link between subjective norm and intention to use. For example, if an employee believes that his supervisor thinks he should use the system, he will comply with the supervisor even if he is not favorable toward using it. *Identification* exists in the relationships between subjective norm and image. When important people of a person's group at work think that the person should adopt the system, he would perceive that performing will enhance his status within the group. *Internalization* occurs in the relationship between subjective norms and perceived usefulness, as "when one perceives that an important referent thinks one should use a system, one incorporates the referent's belief into one's own belief structure" (Venkatesh and Davis 2000: 189). Related work can also be found in Hong and Tam (2006), Hsu and Lu (2004), Kim et al. (2005), Malhotra and Galletta (1999), Venkatesh and Morris (2000), etc. Wu and Lederer (2009) summarized social influence factors such as subjective norm, image, management support and voluntariness.

Based on the review, this research attempts to bridge the following research gaps. First, research on social influence in the IS field focuses on who exerts influence on an individual's system adoption, i.e., mostly supervisors, peers, or friends. However, that research does not explicitly examine how social influence is developed from these sources. In other words, we have limited knowledge about what are the characteristics of these sources that form social influence. Second, in the traditional IS adoption literature, social influence exists outside the system. In our context, social influence is embedded within the system. For example, retail websites (e.g., Amazon, eBay) and online communities (e.g., shopping.com, Epinions.com) allow consumers to post user reviews and provide reviewer information. Hence, social influence is actually integrated in the system itself. Third, in this research, social influences come from strangers whom an individual is not familiar with, rather than someone an individual knows. Thus, it is unclear why and how a consumer should trust unknown individuals and accept their recommendations. To bridge these gaps, we aim to understand how social influence is developed from user reviews within the system. In particular, we investigate the antecedents of different types of social influence from user reviews available in the online setting for product purchase.

Research Model and Hypotheses Development

Drawing from Social Influence Theory (SIT), we differentiate two types of social influence that are common in E-commerce websites: informational influence and value-expressive influence. The normative influence is excluded in the model for the following reason. The normative influence occurs when an individual complies with what the influencing agent wants him to do as a way of achieving a desired response from the agent. In the online E-commerce setting, an individual consumer independently makes a purchase decision on his own. A consumer may seek information and advice from others, but he does not need to comply with others to make his personal decision. In this sense, the normative influence is not applicable to our research context.

Next, based on marketing and IS research on user reviews, we identify three antecedents of social influence: review quality, review consistency and social presence and discuss how they impact the formation of social influence from user reviews respectively. In addition, we take into account differences among individual consumers by adding two moderators: product expertise and self-monitoring. They are expected to play a role in the formation of social influence. Below is the research model (Figure 1).



Antecedents of Informational Influence: An Internalization Process

Informational Influence

An *informational influence* is accomplished through internalization if it is perceived as being instrumental to the solution of a problem and enhancing an individual's knowledge or his ability to cope with his environment (e.g., purchasing a product). Information obtained from others is accepted when it is perceived as evidence about reality (Deutsch and Gerard 1955). Informational influence is based on the desire to make informed decisions by seeking information to reduce uncertainty (Bearden and Etzel

1989). In our research context, informational influence is defined as *the extent to which an individual is influenced by reviewers as enhancing his or her knowledge of a product* (Deutsch and Gerard 1955; Park and Lessig 1977).

Organizational studies suggest that people rely on others for information and problem-solving purposes (Cross and Sproull 2004; Mannes 2009). Cross and Sproull (2004) found that information seekers do more than obtain “answers” from others; rather, they cultivate different kinds of information relationships for the sources of actionable knowledge. Mannes (2009) showed that group wisdom plays a significant role in organizations and individuals rely more on groups than individuals to improve and update their beliefs. Moreover, social network research has highlighted the impact of strength of ties among individuals for obtaining information. In their study of electronic weak ties exchange, Constant et al. (1996) supported that people are more likely to get useful advice from weak ties than strong ties when they can access a diversity of expertise and superior resources. Similarly, Levin and Cross (2004) argued that weak ties lead to the receipt of useful knowledge more than strong ties because weak ties have the potentials to provide novel and non-redundant knowledge.

Informational influence exists in the online environment, since consumers are relying on other consumers’ opinions to evaluate products and make their purchase decisions. Online retail websites and online communities provide a platform for consumers to develop weak tie relationships in which they do not know each other. The weak-tie relationship allows reviewers to share information and facilitates consumers’ knowledge-building process from diverse perspectives. The informational influence reflects the permanent internalization process of a group’s judgment to form veridical beliefs about reality (Mannes 2009), primarily from information communicated from another person (Bagozzi and Lee 2002).

Review Quality

Review quality refers to *a person’s evaluation of the system’s performance in providing reviews based on his experience of using the system* (McKinney et al. 2002; Nelson et al. 2005). High-quality reviews are believed to reduce search cost for fit and search cost for uncertainty associated with a purchase (Chen et al. 2004; Weiss et al. 2008). Quality reviews enhance consumers’ ability to match the product functions with their own situations from different perspectives of others (Chen and Xie 2008). User-generated reviews are preferred when they are perceived as more credible, useful and relevant (Bickart and Schindler 2001; Smith et al. 2005). Thus, quality reviews would receive more precedence and weight in judgment and choice processes, leading to greater persuasive power of the reviews (Feldman and Lynch 1988).

According to SIT, to develop the informational influence, the manner of achieving the induced behavior would be perceived as the best path to the individual’s goals, compared to alternative paths. We argue that high-quality reviews provide consumers the best opportunity to know the product in contrast to low-quality reviews, because high-quality reviews help a consumer understand and evaluate the product more effectively. They will greatly enhance the consumer’s ability to reorganize his knowledge about the product and match his needs with the product (Kelman 1961, 2006). The role of quality has been well-documented as a strong predictor of informational influence in knowledge acceptance and IT acceptance (Bhattacharjee and Sanford 2006; Sussman and Siegel 2003). Zimmer et al. (2007) pointed out that as high quality information requires minimal clarification and refinement, individuals are more likely to use that source. Following the same logic, we hypothesize:

H1a: *Review quality is positively associated with informational influence from user reviews.*

Review Consistency

Review consistency is defined as *the extent to which there is a convergence among a group of reviewers in terms of their opinions of the product* (Moscovic 1981; Nemeth 1986).

Review consistency can be understood from two research streams. Research on group influence has indicated its strong impact on individual judgments. As the size of a group increases, group opinions will be perceived as more accurate in terms of objectivity and representativeness (Chen et al. 2004). Research on majority influence uses majority influence as a proxy for social influence on individuals’ decision

making (Zhang et al. 2007). A majority influence is formed when group members hold consistent opinions or attitudes. According to the convergence theory (Moscovic 1981), the majority facilitates convergence of attention, thoughts, and alternatives. “Judgments made in the public presence of the majority will be subject to majority influence”, as people perceive the majority as offering social reality (Baker and Petty 1994: pp.5).

When consumers read user reviews for a particular product, they are exposed to a group of people that express their personal opinions of the product. Consumers’ evaluation of a product is based on a group of reviewers rather than individual reviewers. Based on the research on group influence and majority influence, we argue that review consistency will impact the development of informational influence. When the majority of reviewers have similar opinions, the consumer will give more weight on the opinion because the opinion is perceived as more correct and reliable (Mannes 2009). When user reviews represents the majority, the consumer’s knowledge of a product will be enhanced and confirmed by a group of people, instead of a single person. According to SIT, high review consistency makes it easier for a consumer to assimilate and internalize others’ opinions into his personal value system of product knowledge. Hence, we hypothesize:

H1b: *Review consistency is positively associated with informational influence from user reviews.*

Social presence

Online consumer behaviors can be viewed within the context of the relationship orientation of individuals, expressed in two distinct dimensions: transactional and social (Mathwick 2002). The transactional orientation focuses on the utilitarian or exchange-based nature of the relationship between a customer and a website. The first two determinants (review quality and review consistency) reflect this orientation as to the usefulness of an online recommendation website in providing user reviews that can influence consumers. On the other hand, there is a growing body of research on the affect and emotion of IT usage as complementary to cognitive beliefs of IT usage (Gefen and Straub 2003; Qiu and Benbasat 2009). In this regard, the social orientation focuses on the personal feelings of intimacy and warmth based on users’ experience of using the website. Social presence has been widely adopted as a proxy to evaluate the emotive reaction of IT usage (Cyr et al. 2009). It refers to *the degree to which a medium allows to establish a personal connection with others* (Short et al. 1976).

Social presence is rooted in the research on organizational communication and is derived from social presence theory and media richness theory. Social presence theory examines the effectiveness of a communication media (Short et al. 1976). The theory posits that media may differ in its effectiveness or ability to communicate the character of the relationship between the sender and receiver in terms of sociability, warmth and sensitivity. Media richness theory explains individuals’ selection of communication media based on media’s capability to convey rich information cues (Daft and Lengel 1986; Daft et al. 1987).

In this research, social presence is based on users’ experience of the website itself (Cyr et al. 2009). It captures the capability of a website to convey rich information via various information cues that allow users to be psychologically connected with each other. Social presence is particularly salient in the online recommendation systems in that credible and meaningful relationships are lacking (Smith et al. 2005). Although, compared with face-to-face communication, a website in its simplest and barest form is information-lean, social presence will be enhanced when the website can address consumers’ needs from different perspectives (Gefen and Straub 2003). For example, in addition to user comments on the product, Amazon takes a personal approach to help consumers make purchase decisions, such as highlighting the most helpful favorite or critical review, indicating X out of Y users found this review helpful, posting the profile of a reviewer and his past contributions in the community, acknowledging a reviewer with a badge (e.g., Top Reviewers) and allowing consumers to rate the review. When the website provides consumers with different information cues other than pure user reviews, consumers are more likely to trust the website and feel a sense of human sociability, warmth and sensitivity of the website (Kumar and Benbasat 2006; Cyr et al. 2009). With the support from the website, user reviews can be easily internalized into a consumer’s personal knowledge. As a result, we hypothesize:

H1c: *Social Presence is positively associated with informational influence from user reviews.*

Antecedents of Value-expressive Influence: An Identification Process

Value-expressive Influence

A *value-expressive influence* is formed through identification when an individual is motivated to enhance his self-concept, by associating himself with positive referents and/or dissociate himself from negative referents (Burnkrant and Cousineau 1975; Park and Lessig 1977). It is characterized by the need for psychological association with a person or a group taken in two forms (Bearden and Etzel 1982). One form is an attempt to resemble or be like the reference group. The other form is simple attachment or liking for the group. Bock et al. (2005) agreed that when the value-expressive influence is present, individual seeks to believe and act in a manner similar to those referents. Thus, it is defined as *the extent to which an individual is influenced by a group of reviewers as the reference group to enhance his self-concept* (Deutsch and Gerar 1955; Park and Lessig 1977).

The nature of value-expressive influence can be understood from Social Comparison Theory, developed by Festinger (1954). The theory suggests that people evaluate their opinions by comparing with others' opinions to the extent that objective and non-social means are not available. In other words, when the correctness of an opinion cannot be immediately determined by reference to the objective physical world, people seek subjective judgments from the social environment (Baker and Petty 1994; Festinger 1954).

In the online recommendation systems, consumers not only seek information from a large social platform through which informational influence is likely to occur, but also others' attitudes toward a particular product through which value-expressive influence is likely to develop. User reviews provide a new information channel for consumers to evaluate the product of interest by utilizing others' opinions from the social environment. Consumers are interested in knowing how others like the product and use others' opinions as a benchmark to form their own preferences.

Review Quality

As discussed earlier, review quality is closely related to consumers' understanding of the product. When the quality of user reviews is high, the value of reviews is increased as they present a comprehensive picture of a product (Bickart and Schindler 2001). According to SIT, the value-expressive influence requires delineation of role requirements. We believe that high-quality reviews clearly specify the product features based on user experiences, so that consumers are able to make their own judgments on the product. As high-quality reviews increase reviewers' credibility perceived by consumers, they could facilitate consumers to effectively associate themselves with reviewers. Since information from a trustworthy source can lead to a greater persuasiveness (Wilson and Sherrell 1993), consumers tend to identify themselves with those who write high-quality reviews. Thus, we hypothesize:

H2a: Review quality is positively related to value-expressive influence from user reviews.

Review Consistency

According to the majority influence research, when a majority endorses a particular viewpoint as the correctness of opinions, people should be more easily identified and influenced by a majority (Baker and Petty 1994). It means that when most reviewers have convergent opinions on a product, a consumer will use the group as the reference group and adopt the group opinion to follow (Bearden and Etzel 1982; Hsu and Lu 2004). SIT also suggests that when individuals are concerned with social anchorage of behavior, they are more likely to identify themselves with others in the social environment. In these regards, we argue that consistent reviews will enhance consumers' desire to be like a group of others because it is easy for a consumer to develop his personal judgements on the product by following a majority.

H2b: Review consistency is positively associated with value-expressive influence from user reviews.

Social Presence

As discussed earlier, social presence represents users' experiences of the website. When consumers read user reviews, they are concerned about the trustworthiness of review content (Chen et al. 2008). To address this concern, Dellarocas (2003) suggested that the website exercises quality control mechanisms to increase the value and influence of user reviews to consumers. For instance, the website provides tools for consumers to check reviewers' profiles and acknowledge their past contributions. When the website supports and cares about consumers by providing them multiple means to know reviewers, consumers are able to rely on user reviews and easily identify themselves with other reviewers. In this regard, we expect:

H2c: *Social presence is positively associated with value-expressive influence from user reviews.*

Moderation Effects of Individual Differences

Research on consumer behaviors has suggested that consumers are different from each other, which will affect decision-making outcomes (Zhu and Zhang 2010). In this regard, our model incorporates two moderators to understand how individual differences play a role in the formation of social influence: product expertise and self-monitoring.

Product Expertise

Product expertise refers to *the degree to which a user's knowledge about or familiarity with the intended product* (Pereira 2000; Xiao and Benbasat 2007). Consumers adopt different strategies to make purchase decisions based on different levels of product expertise. Olshavsky (1985) differentiated two types of decision-making process: own-based and other-based. In the own-based process, consumers rely on themselves to search for information, evaluate the product and make purchase decisions. In the other-based process, consumer subcontract either part or all of their decision-making process (Xiao and Benbasat 2007). It is found that expert consumers are more likely to adopt own-based strategy as they have the capacity to process information and make decisions; in contrast, novice consumers are more likely to adopt other-based strategy (King and Balasubramania 1994).

As consumers have different information-processing capabilities due to different levels of expertise, Chen and Xie (2008) agreed that seller-created product information may be more useful to more sophisticated consumers (i.e., experts); user-generated product information can help less-sophisticated consumers (i.e., novices) in finding their best-matched products. Similarly, Pereira (2000) found that individuals with lower product knowledge tend to have lower satisfaction in the decision process and lower confidence in the decision because they are less equipped to process product information on their own. Following the same logic, we expect that product expertise weakens the formation of informational influence. When consumers are very knowledgeable about a product, they will apply their own knowledge with limited help from user reviews. When consumers have low product knowledge before reading reviews, they will rely on reviewers' opinions to develop their own knowledge of the product. In other words, less knowledgeable consumers will be influenced by user reviews more than knowledgeable consumers. Thus, we hypothesize

H3a: *Product expertise weakens the relationship between review quality and informational influence from user reviews.*

H3b: *Product expertise weakens the relationship between review consistency and informational influence from user reviews.*

H3c: *Product expertise weakens the relationship between social presence and informational influence from user reviews.*

Self-monitoring

Self-monitoring refers to *the extent to which people regulate their self-presentation by tailoring their actions in accordance with immediate situational cues or social cues* (O'Cass 2000). The concept is introduced to understand individual differences and the extent to which they can regulate their behaviors and self-presentation in social contexts (Snyder 1974). Individuals with high self-monitoring are sensitive

to social cues that indicate socially desirable or appropriate behavior and use such cues to modify their own behavior; while individuals with low self-monitoring are relatively insensitive to social cues and tend to maintain a consistent self-presentation across different situations (O’Cass 2000).

As self-monitoring focuses on aligning individuals’ behaviors with socially desirable behaviors, we expect that self-monitoring moderates the formation of value-expressive influence. That is, a consumer with high self-monitoring will tend to be influenced by a group of reviewers and follow them through the identification process. When a majority of other consumers hold consistent opinions on a product, consumers with high self-monitoring would perceive others’ behavior as socially desirable and thus, appropriate to themselves. They tend to identify themselves more easily with others. As a result, we hypothesize:

H4a: *Self-monitoring strengthens the relationship between review quality and value-expressive influence from user reviews.*

H4b: *Self-monitoring strengthens the relationship between review consistency and value-expressive influence from user reviews.*

H4c: *Self-monitoring strengthens the relationship between social presence and value-expressive influence from user reviews.*

Research Methodology

Research Design and Product Selection

We conducted an online survey in a controlled lab environment to validate the research model. The combination of an experiment and a survey ensures participants’ real-time impression and evaluation on a given product. It allows us to control confounding factors that may interfere with the casual relationships hypothesized in the model. A pilot study was first conducted to make sure that the experiment procedures were properly set and survey items could be understood correctly.

We used Amazon.com as the experimental site. Amazon.com is an ideal site because it is well known for building effective recommendation systems that provide excellent support for virtual communities and rich user base for user reviews (Kumar and Benbasat 2006).

We chose the digital camera as the product for the experiment. The digital camera is an ideal product category to study online consumer reviews for the following reasons (Chen and Xie 2008). First, the digital camera has been ranked as one of the top five hottest markets in the Consumer Electronics Association’s annual ownership study (Raymond 2006). Second, the Internet has been the most popular channel for consumers to buy digital cameras (Photo Marketing Association International 2001). All the selected cameras were released in Amazon.com between 2008-2010 at a price around \$200. The criteria for selecting digital cameras were star ratings (1-5), the number of user reviews (high vs. low), and review consistency (high vs. low). Products were selected with a goal of ensuring product variety and to capture variations in user reviews. There were 18 products selected for the study.

Instrument Development

Whenever possible, the survey adopted existing items measured by a 5-point Likert scale (1-strongly disagree, 5-strongly agree). Based on the information quality literature and relevant marketing literature on user reviews (McKinney et al. 2002; Nelson et al. 2005; Zhu and Zhang 2010), we developed 3 items for review quality. As each item represents a portion of the overall quality (e.g., adequacy, reliability, relevancy), review quality is modeled as a formative construct (Petter et al. 2007). For review consistency, due to lack of existing perceptual items, we developed three new items based on relevant literature (Baker and Petty 1994; Moscovic 1981; Nemeth 1986; Zhang et al. 2007). For social presence, we adopted well-validated items based on the E-commerce literature (Cyr et al. 2009; Gefen and Straub 2003; Kumar and Benbasat 2006; Qiu and Benbasat, 2009). The items for informational influence and value-expressive influence were adopted from the social influence research (Bearden et al. 1989; Deutsch and Gerard 1955;

Park and Lessig 1977). We also used validated items for product expertise and self-monitoring (O’Cass 2000; Pereira 2000). Age, gender and education were included as control variables.

Research Procedures

At the beginning of the experiment, the webpage of user reviews for each selected product was opened on each computer. A research assistant randomly assigned each participant to a computer. Then the instructor read the experiment procedures and instructions to the participants. In order to make sure that participants were at the same pace in the experiment, we demonstrated the system features of Amazon.com user reviews. Next, the participants were instructed to read user reviews for a given product within 10 minutes. They were allowed to click on the pages that are about user reviews and reviewers’ profiles. To make sure that participants followed the instructions to read user reviews, we used Camtasia (a motion-recording software) to record participants’ browsing activities during the experiment. Finally, when they finished reading reviews, participants were asked to fill out an online survey.

We recruited undergraduate students in the Spring 2011 semester at a major southeast university. To encourage students’ voluntary participation, we gave away 20 \$20 Amazon gift cards based on a random raffle drawing. The total sample size is 84. Table 1 presents participant demographics.

Gender		Age		Education	
Male	51.2%	18-30	91.7%	High school or equivalent	4.8%
Female	48.8%	31-40	3.6%	Vocational/technical school	/
		41-60	4.7%	Some college	41.7%
		>60	/	Bachelor’s degree	51.2%
				Master’s or higher degree	2.4%

Data Analysis and Results

As the model includes a formative construct (review quality) and is exploratory in nature, we used PLS-based structural equation modeling (SEM) technique. SmartPLS 2.0 (Ringle et al. 2005) was adopted to validate the model.

Measurement Model

Since we incorporated newly-developed items, we first ran the exploratory factor analysis in SPSS. Several items were dropped due to low factor loadings. Then we ran the confirmatory factory analysis in SmartPLS 2.0 and assessed construct reliability, convergent validity and discriminant validity. For reflective items, reliability is evaluated by computing AVE, composite reliability and Cronbach’s alpha (Bagozzi and Yi 1988). The general acceptable cut-off values are 0.50 for AVE, and 0.70 for both CR and Cronbach’s alpha (Bagozzi and Yi 1988). Table 2 shows that all the constructs exceeds the cut-off values except sensitivity to expressive behavior of others (0.67). Convergent validity is established when the factor loading of an item on its designated construct is 0.60 or more (Chin et al. 1997). Table 2 also shows that all the items meet this requirement. Discriminant validity is assessed by examining if the correlation between a pair of constructs is less than the square root of AVE of each construct (Chin 1998). Table 3 shows that although the correlation between review quality and informational influence is a little high (0.71), all the square roots of AVEs on the main diagonal are greater than the pair-wise correlations between constructs on the off diagonal, implying that all the constructs are distinct. We also followed Petter et al. (2007) to check reliability and validity for the formative construct: review quality. The results indicate that review quality is reliable and valid as a formative construct.

Table 2. Internal Consistency, Reliability and Convergent Validity							
Construct	AVE	Composite Reliability	Cronbach's Alpha	Items	Parameter Estimate	T value	
Review Quality	N.A. ¹	N.A.	N.A.	RQ1	0.480***	3.701	
				RQ2	0.486***	3.879	
				RQ3	0.312**	2.378	
Review Consistency	0.64	0.84	0.74	RC1	0.765***	4.295	
				RC2	0.812***	4.364	
				RC3	0.831***	4.557	
Social Presence	0.60	0.80	0.83	SP1	0.730***	8.616	
				SP2	0.746***	12.670	
				SP3	0.656***	7.159	
				SP4	0.840***	16.388	
				SP5	0.884***	38.829	
Informational Influence	0.68	0.89	0.84	II1	0.885***	44.576	
				II2	0.898***	51.618	
				II3	0.634***	4.800	
				II4	0.858***	18.875	
Value-expressive Influence	0.65	0.90	0.84	VI1	0.709***	9.885	
				VI2	0.816***	22.310	
				VI3	0.892***	52.854	
				VI4	0.775***	15.886	
				VI5	0.832***	20.589	
Product Expertise	0.79	0.92	0.87	PE1	0.917***	4.446	
				PE2	0.931***	4.350	
				PE3	0.810***	3.278	
Self-monitoring	Ability to modify self-presentation	0.54	0.86	0.79	SMSP1	0.782***	16.263
					SMSP2	0.638***	5.274
					SMSP3	0.737***	12.239
					SMSP4	0.710***	8.499
					SMSP5	0.805***	22.557
	Sensitivity to expressive behavior of others	0.51	0.80	0.67	SMEB1	0.769***	9.409
					SMEB2	0.726***	7.599
					SMEB3	0.678***	6.691
					SMEB4	0.667***	8.343

***Significant at the 1% level of significance

¹ As review quality is a formative construct, SmartPLS does not report AVE, Composite Reliability and Cronbach's Alpha. For parameter estimation, we report weights for RQ1, RQ2 and RQ3 respectively.

	Mean	S.D.	AVE	RQ	RC	SP	II	VI	PE	SMSP	SMEB
Review Quality (RQ)	3.83	0.63	N.A.	N.A.							
Review Consistency (RC)	3.18	0.97	0.64	0.04	0.80						
Social Presence (SP)	3.36	0.88	0.60	0.31	0.21	0.77					
Informational Influence (II)	4.06	0.80	0.68	0.71	-0.12	0.12	0.82				
Value-expressive Influence (VI)	2.42	1.03	0.65	0.24	0.27	0.51	0.09	0.81			
Product Expertise (PE)	3.79	0.78	0.79	0.04	-0.24	-0.16	0.12	-0.15	0.89		
Ability to modify self-presentation (SMSP)	3.77	0.77	0.54	0.36	0.20	0.04	0.22	0.01	0.11	0.73	
Sensitivity to expressive behavior of others (SMEB)	3.91	0.63	0.51	0.19	0.23	-0.05	0.06	-0.12	-0.08	0.33	0.71

Structural Model

SmartPLS 2.0 was used to test the structural model and hypotheses. R² is the primary way to evaluate the explanatory power of the model (Wasko and Faraj 2005). Overall, those independent variables account for 59.0% of the variances in informational influence and 32.9% of the variances in value-expressive influence. Figure 2 summarizes the structural results. Consistent with H1a, review quality is positively related to informational influence. Contrary to H1b, review consistency negatively impacts informational influence. Social presence is shown to be insignificant in developing information influence, thus H1c is not supported. In terms of value-expressive influence, review quality does not significantly impact value-expressive influence (H2a); while review consistency and social presence are positively related to value-expressive influence (H2b and H2c). For the moderation effects, product expertise is shown to weaken the relationship between social presence and informational influence. Thus, H3a and H3b are not supported. H3c is supported. Self-monitoring is shown to have no impacts on the formation of value-expressive influence, leading to H4a,b,c rejected. For control variables, gender is negatively associated with informational influence.

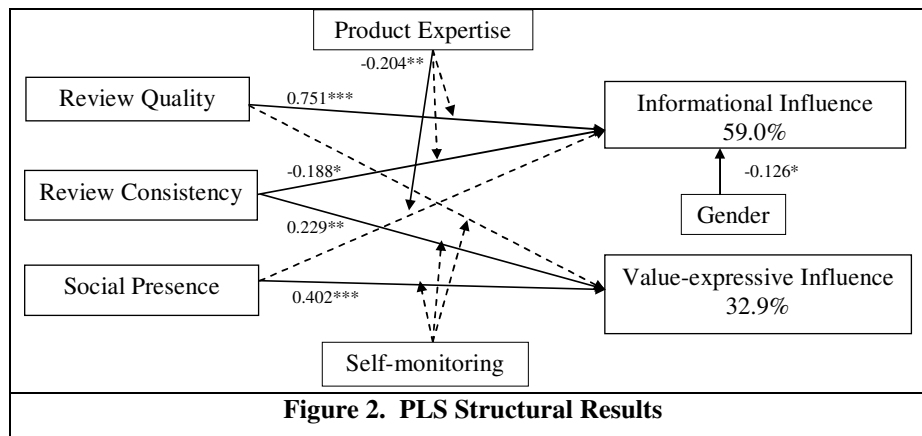


Figure 2. PLS Structural Results

***Significant at the 1% level of significance
 *Significant at the 10% level of significance

**Significant at the 5% level of significance

Discussion

Based on Figure 2, the model indicates that mechanisms of developing informational influence and value-expressive influence are quite different.

Our findings indicate that informational influence mainly comes from high-quality reviews. As high-quality reviews help consumers better know the product, they reduce their uncertainty in product selection and make informed decisions. When consumers perceive that reviews are sufficient, reliable and relevant to their needs, they are more likely to be influenced by reviewers' personal experiences of using the product. It is interesting to find that review consistency is negatively related to informational influence. It implies that when reviewers shared a similar opinion about a product, consumers may not need to read individual reviews to accumulate product knowledge for making decisions. They may simply follow and use overall reviewers' opinions to make their own decisions. In this case, they are less likely to be influenced by the detailed contents of individual reviews. Social presence captures the perceptions of personal connections with others enabled by the system features, such as allowing users to view reviewers' profile and past contribution, rate individual reviews, etc. As social presence is shown to have no direct impacts on informational influence, one explanation could be that consumers pay fewer attentions to IT-enabled system features other than the reviews themselves when they receive informational influence.

Regarding value-expressive influence, consumers are more likely to be influenced by what the majority of people think of and will follow their opinions, as they use the majority opinion as social anchorage of behavior. Highly consistent reviews make it easy for consumers to identify themselves with reviewers in the social environment. In addition, when the website implements IT-enabled system features that facilitate establishing personal connections between consumers and reviewers, consumers are more likely to identify themselves with reviewers. That is to say, by knowing more about reviewers, consumers are more willing to follow them. Our findings also indicate that review quality does not impact value-expressive influence. It implies that self-identification with reviewers could simply be based on following the majority opinion and taking advantage of system features to know reviewers, regardless of what they said.

We also tested the moderation effects of product expertise and self-monitoring. Product expertise only weakens the relationship between social presence and informational influence, although social presence does not impact informational influence directly. When a consumer is more knowledgeable about a product, he may care less about the reviewers' and is less likely to use IT-enabled system features to form his own decision. Thus, the impact of social presence will be weaker on informational influence. Interestingly, self-monitoring does not strengthen the relationships between review quality, review consistency and social presence and value-expressive influence respectively as hypothesized. One reason might be that self-monitoring behaviors have been typically examined in the offline settings where people communicate face-to-face; however, self-monitoring behaviors could be very different in the online setting where people do not know each other and can not see others' real expressions and behaviors. Thus, existing research on self-monitoring may not be applicable to the online setting.

For control variables, the model shows that males are more likely to develop informational influence from user reviews than females. Male consumers would probably spend more efforts on reading reviews, thus leading to stronger informational influence. It implies that males tend to be more facts-orientated and rational to make purchase decisions.

Conclusion

To sum up, this study attempts to understand how online user reviews impact consumers in the decision-making process. Grounded on Social Influence Theory, our model indicates that consumers are influenced by user reviews through two types of social influence: informational influence and value-expressive influence. Moreover, it is revealed that social influence can be developed via different mechanisms. Review quality positively impacts informational influence while review consistency negatively impacts informational influence. Review consistency and social presence positively impact value-expressive influence. Product expertise is shown to weaken the relationship between social presence and informational influence. Self-monitoring does not have any moderation effects on the formation of value-expressive influence.

This study provides useful insights for online retailers and manufacturers on product development and sales. User reviews may be used as an information tool to better understand consumers' needs. Based on user reviews, the manufacturer can improve the product in terms of functionality, aesthetic design, etc to attract new consumers in order to increase market share. User reviews can also be used and advertised as

a marketing tool to promote the product, as they are perceived as more influential and persuasive than marketer-generated ads or editorial reviews. In terms of system design, this study sheds light on how to take advantage of IT artifacts to maximize the value of user reviews and help consumers make effective purchase decisions. Based on the identification of types of social influence from user reviews, online retailers need to recognize the importance of social influence in consumer decision making. To make sure that user reviews are helpful for consumers, it is critical to be aware of factors that facilitate the formation of social influence. By understanding social influence in E-commerce, online retailers and manufacturers are able to provide more competitive products and better services to consumers.

This study contributes to the IS literature in the following ways. First, SIT has been applied to the IS field to understand how social influence affects system adoption and usage. As discussed earlier, the sources of social influence come mainly from supervisors, peers and friends whom individuals are familiar with. This study takes a different angle to investigate social influence from consumers who do not know each other in the context of E-commerce. The purpose is to understand the underlying mechanisms under which consumers are influenced by user reviews. Second, in the online retail website or their-party online communities, social influence has been embedded into the system as user reviews become an integrated part of the system itself. Thus, this study explores how perceptions of IT-enabled system features facilitate the formation of social influence and decision making. Third, to the best of our knowledge, this is one of the first IS studies that recognize and differentiate different types of social influence and examine their antecedents. By doing so, this study advances our knowledge about the processes via which consumers are influenced. Fourth, we empirically validate the measurement items for social influence in online recommendation systems. The scales for social influence has been receiving heated debate and validation in the sociology literature, but are less understood in the IS literature.

There are several limitations worthy of further investigation. First, as the unit of analysis is per product, respondents were asked to evaluate the product based on their perceptions on the overall user reviews of the product, NOT perceptions on individual reviews. One potential area of future research could be exploring how individual reviews affect consumers differently. Second, as we used the digital camera to validate the model, we ruled out the impact of product-related factors (e.g., product type, perceived product risk, product complexity) and did not discuss how social influence varies across product categories. Future studies should examine how these factors affect the formation and impact of online social influence by looking at more products from a variety of categories. Third, future research might also take into account consumer differences from a consumer psychology perspective. For example, some consumers tend to be more sensitive to negative reviews, while others consider both positive and negative reviews equally important. Fourth, although we argue that user reviews impact the formation of social influence that is part of consumers' decision-making process, our model did not explicitly examine how user reviews impact decision-making outcomes. Last but not least, since self-monitoring was not significant in moderating the formation of social influence from user reviews, it raises an interesting research area as to understanding of how self-monitoring can play a role in online settings.

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