

USER PARTICIPATION INTENTION AND SOCIAL INFLUENCE  
IN VIRTUAL COMMUNITIES

by

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## ABSTRACT

YIMING ZHENG. User participation intention and social influence in virtual communities. (Under the direction of DR. ANTONIS STYLIANOU and DR. KEXIN ZHAO)

A virtual community (“VC”) is a group of people who interact primarily via IT, rather than face-to-face, for informational, social, professional, educational or other purposes. Given the growing popularity and special features of VCs (user-generated contents, virtual social interaction and voluntary participation), this dissertation intends to understand two user behaviors: users’ continuance intention to participate and consumer purchase decision. The dissertation consists of three studies. Study 1 focuses on how the quality of user-generated contents and system performance impact users’ continuance intention to participate in information-exchange VCs. In particular, this study investigates VC quality from a multi-dimensional perspective. As an extension of Study 1, Study 2 examines the role of users’ past behavior on future participation intention. The objective of Study 3 is to understand the role of user-generated contents, namely, user reviews, and system performance in consumer decision-making outcomes in the context of transaction-based VCs. This study differentiates types of social influence developed from user reviews and investigates their sources and impacts on consumer purchase decision and system evaluation. The model also incorporates two individual characteristics to understand consumer differences in the formation of social influence. This dissertation intends to contribute to the IS literature on user behaviors in VCs and the value of VCs. It provides meaningful insights for VC design and management.

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## CHAPTER 1: INTRODUCTION

### 1.1 Motivation

An online community (“VC”) is a group of people who interact primarily via IT, rather than face-to-face, for informational, social, professional, educational or other purposes (Jones et al. 2004; Lee et al. 2003). Due to the prevalent Internet access and increasingly advanced Web 2.0 applications, the growth of VCs has been phenomenal and has attracted millions of people to become VC users in recent years. In VCs primarily for topic-based information exchange, Google Groups host over 54,000 forums (Ma and Agarwal, 2007) and IMDB has attracted over 4 million users with more than 13 million posts as of June 2010 ([www.big-boards.com](http://www.big-boards.com)). In VCs for transaction-based product recommendations (e.g., Amazon.com, shopping.com), consumers rely on user reviews to help them make purchase decisions (Riller 1999; Zhu and Zhang 2010).

Given the popularity of VCs, their increasing influence on individual users’ decision making and the economic impact in E-commerce, this dissertation intends to understand two consumer behaviors: user continuance intention to participating and consumer purchase decision. To this end, it is necessary for us to first recognize the special features exhibited in VCs.

As a multi-disciplinary research area, VCs have been studied in psychology, sociology, information systems (IS), computer science, etc. Based on different research disciplines, an VC exhibits the following features (Abbot 1988; Finholt and Sproull

1990): (1) user-generated contents for accessing information, sharing and disseminating knowledge; (2) virtual social interaction that develops weak social ties with strangers other than relatives, friends or colleagues; (3) voluntary participation without geographical proximity and face-to-face communication.

These special features highlight the nature of a VC and determine the dynamics and complexity of VC development. Issues that have been identified include information overload (Jones et al. 2004); free-riding (Blanchard 2007; Ridings et al. 2006); sense of belonging and sense of community (Blanchard and Markus 2004; Zhang 2010); online trust (Awad and Ragowsky 2008; Pavlou and Dimoka 2006). In order to better understand the dynamics and complexity of VC development, this dissertation explores how a VC can leverage user-generated contents and IT artifacts to create value to users.

Recognizing the special features of VCs is also related to the sustainable development of VCs (Bagozzi and Dholakia 2002; Butler et al. 2002). First, a VC needs to leverage user-generated contents to attract and retain existing users. Second, a VC should provide solid technological infrastructure as the fundamental condition that makes online social interaction possible. Third, as the IT-based platform, a VC is expected to implement effective mechanisms to manage and control social dynamics. These issues are the keys to encouraging active voluntary participation and development of a VC.

To address these key issues, drawing from IS, marketing, sociology and psychology literature, this dissertation intends to understand the impacts of user-generated contents and system performance on value creation to users in terms of individual benefits, user participation intention, decision making, and system evaluation.

To this end, this dissertation empirically investigates the role of multiple community features from an IS perspective.

## 1.2 Research Objectives and Research Questions

The dissertation consists of three studies.

Study 1 focuses on how the quality of user-generated contents and system performance impact users' continuous participation in VCs for information exchange. With the increasing number of VCs and low switching cost, users have more power to choose and switch from one VC to another. The competition among VCs is rising (Gu et al. 2007). To survive the competition, it is critical for an VC to retain users and encourage their continuous participation and contribution over time (Butler et al. 2002; Chen 2007). A number of studies have investigated user participation in terms of membership size and information volume (Butler 2001; Gu et al. 2007; Jones et al. 2004), however, research on the quality of user-generated contents and system performance is limited. Even though a handful of IS studies have recognized the importance of quality in VCs (Cheung 2008; Lin and Lee 2006; Lin 2008; Zhang and Watts 2008; Park et al. 2010; Zhang 2010), they focused mostly on information quality without looking at system quality except for Zhang's (2010) paper. To extend prior research, based on the IS post-adoption and the IS Success research, this study systematically examines how information and system quality affect users' intention to continue participating in a VC. In particular, we investigate VC quality from a multi-dimensional perspective and examine the role of individual benefits of participation in mediating the relationship between continuance intention and quality issues. The specific research question is: *How*

*do information and system quality affect users' continuance intention to participate in VCs?*

As an extension of Study 1, Study 2 focuses on understanding the role of past behavior in predicting future participation. Prior research on the impact of past behavior on users' continuance intention in VC is limited. Although a couple of papers examined past behavior in VCs, they either focused on the motivations for past behavior (Ridings et al. 2006), or simply treated past behavior (e.g., tenure) as a control variable (Ma and Agarwal 2007). Few studies examined the explicit role of past behavior in driving future participation. Originally, past behavior has been studied extensively in social psychology (e.g., Theory of Planned Behavior), suggesting its direct as well as moderating effects on future behavioral intention (Bagozzi 1981). IS literature has also revealed that past behavior affects future IS use (Bergeron et al. 1995). However, given the special features of VCs, such as user-generated contents and voluntary participation, results in VCs might not be consistent with the existing findings in the traditional context. So, this study intends to answer the following research question: *can we use users' past behavior to predict their future participation intention in a VC?*

Study 3 investigates the role of user-generated contents, namely, user reviews, and system performance in consumer decision-making outcomes. User reviews can exert powerful influence on consumers' purchase decisions as well as on their evaluation of the system. This is evident in the increasing number of consumers that are relying on user reviews for making purchasing decisions (Riller 1999; Zhu and Zhang 2010). Although the impact of user reviews has been widely studied from multiple perspectives such as product sales, marketing strategy, trust development and decision-making process, etc.



(Chevalier and Mayzlin 2006; Kumar and Benbasat 2006; Pavlou and Dimoka 2006; Zhu and Zhang 2010), earlier studies treat user reviews as exogenous and take them for granted. None of them examined explicitly the underlying mechanisms through which social influence is developed from user reviews. This could partly explain the inconsistent results found in research studying the impact of user reviews on product sales. In order to open the black box, it is critical for us to understand what factors affect the formation of social influence from user reviews and why and how user reviews play a role in consumers' decision making and system evaluation.

Based on Social Influence Theory (SIT), IS and marketing research on user reviews, this study identifies different types of social influence developed from user reviews and investigates their sources and impacts on the consumer purchase decision and system evaluation. Consumer differences are taken into account to understand their roles in the formation of social influence. The research questions are:

1. How do different types of social influence are developed from user reviews?
2. How do different types of social influence impact product and system evaluation?
3. How do consumer differences play a role in the formation of social influence from user reviews?

### 1.3 A Topology of Online Communities

There is no universal definition of an VC in the IS field, as the term has been used in different research contexts. In the organizational context, an Email-based VC is a fast, asynchronous and text-based communication channel through which employees are able to work together (Finholt and Sproull 1990; Constant et al. 1996). Nowadays, VCs have evolved from Email into a variety of forms, such as Instant Messenger, online forums,

social networking sites, blogs, wikis, etc. Bagozzi and Dholakia (2002) described an VC as a *virtual community* that is a digitally-mediated social space where groups are formed and sustained through communication processes. Lee et al. (2003) considered a VC as an *IT-supported virtual space* composed of a group of people who are individual or collective goal-seekers for social interaction and relationship development. In order to better understand the concept of a VC, Table 1 provides a typology of VCs based on the existing literature and observations (Table 1).

TABLE 1. A Typology of Online Communities					
Dimension	Attributes				References
Functionality	transaction	information access	Fantasy	relationship	Armstrong and Hagel 1995; 1996
Member Relationships	family /friendship ties	corporate ties	stranger ties		Butler et al. 2002
Content	work-related	non work-related			Butler et al. 2002
Communication Method	e-mail	text-based message	audio/video	picture	Blanchard 2007
Timeliness	synchronous	asynchronous			Jones et al. 2004;
Identity	anonymous	virtual identity	real identity		Ma and Agarwal 2007
Accessibility	registration required	guest/open			observation
Quality Control	no control	moderation	reputation system		observation
Users	non-expert	expert			observation

Study 1 and Study 2 focus on the VC for information exchange, defined as an IT-based virtual space that is composed of a group of people who are individual or collective goal-seekers for accessing information, sharing and disseminating topic-related experiences and knowledge (Gu et al. 2007; Jones et al. 2004; Lee et al. 2003). The

reason to choose this type of VC is that although quality has been identified as a big concern and a potential factor in VC success, research on a comprehensive understanding of its impacts is lacking in VCs for information exchange.

As the main purpose of Study 3 is to understand the social influence of user reviews in VCs, transaction-based VCs are selected as the research scope. It refers to *an IT-based virtual space that is composed of a group of consumers for accessing and sharing user reviews with others to facilitate product purchase decisions* (Dellarocas 2003; Kumar and Benbasat 2006; Mudambi and Schuff 2010).

Table 2 below is a summary of the research scope for Study 1, Study 2 and Study 3 based on the topology in Table 1.

TABLE 2. The Research Scope			
	Research Scope	Features	Examples
Study 1 Study 2	Information-exchange VCs	<ul style="list-style-type: none"> <li>• Information access by topic</li> <li>• Stranger tie</li> <li>• Work-related or non</li> <li>• Text-based messages</li> <li>• Asynchronous</li> <li>• Virtual or real identity</li> <li>• Registration required or not</li> <li>• Different level of quality control</li> <li>• Ordinary users and experts</li> </ul>	<ul style="list-style-type: none"> <li>• Topic-based online forums/message boards: VirtualTourist, IMDB, Yahoo!Finance, BabyCenter, DisabledOnline</li> <li>• Electronic networks of practice for professionals: NationalInstituteofCorrections Community, SourceForge, OnlineCommunityResearch</li> </ul>
Study 3	Transaction-based VCs	<ul style="list-style-type: none"> <li>• Transaction-based</li> <li>• Stranger tie</li> <li>• Non-work related</li> <li>• Any type of communication methods in Table 1-1</li> <li>• asynchronous</li> <li>• Real or virtual identity</li> <li>• Registration required or not</li> <li>• Different level of quality control</li> <li>• Ordinary users</li> </ul>	<ul style="list-style-type: none"> <li>• Online retail websites: Amazon.com, eBay.com</li> <li>• Third-party VCs: shopping.com, zagat.com, tripadvisor.com</li> </ul>

#### 1.4 Theoretical Contributions

Given the popularity of VCs and their special features discussed above, the dissertation intends to enrich our knowledge about the impact of VCs in user participation and decision making.

Study 1 contributes to the literature by integrating IS post-adoption and IS Success research as the theoretical lens to understand users' continuance intention to participate in VCs. The integration presents a comprehensive view of the phenomenon and enhances our understanding of VC development and success over time. In addition, this study adds to the current work on VCs with a particular focus on the quality of both user-generated contents and the system itself from a multi-dimensional perspective. This study highlights and discusses quality concerns that are salient in the VC context. To encourage continued user participation, VCs need to keep these concerns in mind when they design and manage their system.

Study 2 extends Study 1 by looking at past behavior in motivating future participation intention. This is one of the first IS studies that considers past behavior from multiple perspectives (i.e., tenure and extent of usage). In addition, the use of objective measures enriches our understanding of the impact of users' actual behaviors. Our results imply that it is necessary to differentiate tenure and extent of usage since they motivate users' continuance intention differently. In addition, this paper examines both the direct and moderating effects of past behavior on future behavior. Moreover, this study contributes to IS post-adoption literature by extending the meaning of *perceived usefulness* to four types of perceived individual benefits. We empirically examine their impacts on continuance intention in VCs.

Study 3 advances our knowledge of how social influence from user reviews is developed and its impacts on consumers' decision-making outcomes. Different from previous IS studies that treat social influence as external sources (e.g., supervisors, peers) outside of the system, the social influence embedded within the E-commerce system comes mainly from strangers unknown to each other before. This study explicitly differentiates two types of social influence that exist in E-commerce and identify its determinants and impacts on consumers' decision making and system performance. In addition, this study is the first step to incorporate consumer differences as moderators to explore their role in the strength of social influence in the online setting.

### 1.5 Practical Implications

The dissertation will generate meaningful practical implications for the design and management of VCs.

Based on the results from Study 1, VC managers need to know that high-quality information and system design are the primary factors that motivate users to continue using the services. High information and system quality generate different individual benefits of participating in VCs. In order to ensure high quality, VCs need to set up quality control mechanisms to deliver valuable information to users. At the same time, VCs should enhance system design to facilitate the information-exchange process and social interaction, by encouraging and acknowledging user voluntary contribution. Our results help VC managers to understand the users' major quality concerns. Being more responsive to these concerns, VCs will be more likely to maximize their value to users and satisfy their needs. From a long-term perspective, quality-awareness will not only benefit individual users but also VCs themselves. VCs may use quality as a strategy to

attract new users and even “lock-in” current users to survive the severe competition (Gu et al. 2007).

Based on Study 2, users can be grouped as experienced vs. novice users and heavy vs. light users, as users behave differently based on their past behavior (e.g., tenure and extent of usage). The findings emphasize the necessity of developing different motivation mechanisms for market segmentation in VCs. VC managers need to think about how to retain different kinds of users and motivate their active participation.

Study 3 provides useful insights on product promotion for commercial websites and product development for manufacturers. Both websites and manufacturers need to realize the importance of user reviews in consumer decision making. By understanding social influence from user reviews, the primary goal is to maximize the business value of user reviews and leverage their potential social influence to provide better products and services to consumers, ultimately increasing sales and customer loyalty.

## 1.6 Organization of the Dissertation

The dissertation is organized as follows: Study 1 is presented in Chapter 2, which discusses the impacts of information quality and system quality on continuance participation intention. In Chapter 3, study 2 examines the role of past behavior in future participation as an extension of Study 1. Study 3 in Chapter 4 investigates social influence from user reviews.

## CHAPTER 2: THE IMPACTS OF INFORMATION AND SYSTEM QUALITY ON USERS' CONTINUANCE INTENTION IN INFORMATION-EXCHANGE VIRTUAL COMMUNITIES: AN EMPIRICAL INVESTIGATION

### 2.1 Introduction

#### 2.1.1 The Definition of Virtual Communities (VCs)

An information-exchange VC is an IT-supported virtual space that is composed of a group of people for accessing, sharing and disseminating topic-related experiences and knowledge through communication and social interactions (Jones et al, 2004; Lee et al 2003). Due to the prevalent Internet access and increasingly advanced Web 2.0 applications, the growth of VCs has been phenomenal and millions of people have become VC users in recent years. For example, Yahoo Groups has attracted 113 million users and formed 9 million groups in 22 languages ([www.yahoo.com](http://www.yahoo.com)). IMDB (Internet Movie Database) has attracted over 4 million users with more than 13 million posts as of January 2012 ([www.big-boards.com](http://www.big-boards.com)).

In information-exchange VCs, individual users can share their experiences and stories on a common topic of interest (e.g., travel, health, stock information). Typically, VCs are open to everyone from everywhere, without geographical boundaries or company-specific restrictions. Examples are online forums, message boards, discussion groups, etc. Users typically do not know each other and participation is voluntary.

### 2.1.2 The Importance of Continued Participation in VCs

A user's participation intention is based on his individual needs and participation experiences of using a VC. If a VC cannot satisfy user needs in finding useful information or a VC is not efficient and effective in providing access to information from others, a user may not be willing to stay in the VC. Given the increasing number of VCs for information-exchange, a user has more freedom to decide in which VC he or she wants to participate. Furthermore, as user registration is free in most information-exchange VCs, low switching cost makes it easy for users to switch. Thus, competition among VCs is rising (Gu et al. 2007).

In order to succeed and survive, VCs need to attract new users and retain existing users for their participation and contribution (Butler et al. 2002; Chen 2007). The motivations for new users and existing users to participate in a VC are different. A new user may join a VC simply because of someone he or she knows using the VC, or as a result of random information search by a search engine over the Internet or an online promotion from the VC. In this case, a new user may not have a clear picture of the VC before he or she joins. However, an existing user can decide on continuing participation based on his actual usage in the VC. As an existing user, his intention to continue participating would be based mostly on his actual usage.

User retention and continued participation are critical to VC success (Zhang et al. 2010). Jones (1997) argued that one important characteristic of VC success is the level of sustained membership. Marketing researchers have studied customer retention, service consumption and coproduction in managing the relationships between organizations and consumers (Gruen et al. 2000). They found that the membership relationship is a key



asset of an organization, as customers may exhibit voluntary citizenship behaviors (e.g., helpful and constructive behaviors) that are valued or appreciated by the organization, in addition to consumption of pre-paid products or services. Continued membership positively increases members' identification with the organization (Bhattacharya et al. 1995) and reduces the likelihood of lapsing (Bhattacharya 1998). According to the theory of network externalities (Katz and Shapiro 1992), if a VC can maintain a large pool of existing users, it will attract more new users. Individuals are more likely to join larger VCs than smaller ones, as larger VCs are assumed to have more information sources (Gu et al. 2007). In addition, the presence of network externalities enables VCs to take advantage of economies of scale to operate and grow in a cost-effective way and provide more benefits to users (Gallaughan 1999).

Therefore, it is important to understand *what factors drive the continuance intention to participate in information-exchange VCs and how*.

### 2.1.3 The Challenge to Continued Participation in VCs

Although a number of IS studies have examined user participation behaviors in VCs (Butler 2001; Jones et al. 2004), a limited number of studies have paid attention to user retention and continued participation (Chen 2007; Zhang 2010), which is a challenging issue. Not many VCs are successful in retaining users and motivating their continued usage (Ma and Agarwal 2007). Some VCs end up with little user participation and disappear completely (Iriberry and Leroy 2009).

The challenge relies on the following aspects. First, given the increasing number of VCs and low switching cost, users can switch easily from one to another. Second, since participation is largely voluntary, users can decide when they want to participate

and their level of participation. In other words, there is no control over users as to how much time and efforts they are supposed to spend in VCs.

#### 2.1.4 The Research Objectives

To address this challenge, we investigate users' continuance intention to participate in VCs by examining information and system quality. Butler (2001) argued that the amount of information on its own is not enough to retain users, unless it is transferred to benefits for users, leading to a sustainable VC. Gu et al. (2007) found that the value of a VC increases with the number of high-quality posts, because high-quality posts play an important role in helping users achieve individual benefits and in satisfying their needs. Hence, VCs need to either manage the quality of information itself (e.g., deleting information that is off-topic and out of date) or encourage users to contribute high-quality information to the community.

On the other hand, user participation is largely facilitated through technical infrastructure (Markus 2005). Due to the limited information processing capability of human beings, an excess increase in information volume is likely to cause information overload, discourage active participation and, ultimately, lead to membership loss (Butler 2001; Jones et al. 2004). VCs need to enhance system design to make participation easier and enjoyable, and encourage active participation and effective user interaction.

In these regards, we argue that the quality of both the information itself and the technical infrastructure matter. Ultimately, quality can be used as a strategy to "lock-in" users in the long run (Gu et al 2007).

As the focus is to understand the role of quality in users' continuance intention, information-exchange VCs are appropriate as the research scope, which will minimize

confounding factors salient in other types of VCs. For instance, in social networking sites, users' continuance intention to participate could be driven by not only information quality, system quality but also by personal relationships developed offline. So, the selection of information-exchange VCs makes this study more focused on the impact of quality.

#### 2.1.5 The Research Gap

Recently, a number of researchers have investigated quality in VCs. Lin and Lee (2006) argued that information quality influences user satisfaction and intention to participate, which will determine their loyalty to a VC. Similar results were obtained by Lin (2008). Cheung et al. (2008) found that the relevance and comprehensiveness of electronic word-of-mouth influence information usefulness and, subsequently, the users' information adoption decisions in a food VC. Moreover, Zhang and Watts (2008) showed a positive relationship between both information and system quality with information adoption from a cognitive perspective in two online forums. In their study of stock message boards of a Korean VC, Park et al. (2010) indicated that higher perceived quality leads to higher perceived usefulness of the community, which impacts users' seeking and sharing behaviors. Zhang (2010) examined the impacts of quality on users' sense of community in social networking sites. He or she found that information quality plays a substantial role in developing sense of community, while system quality does not.

While the IS studies reviewed above have examined quality in VCs, they treated quality as an aggregated and uni-dimensional concept. Prior IS research has widely agreed that quality is a multifaceted concept with a variety of quality dimensions (Nelson et al. 2005; Wang and Strong. 1996). These quality dimensions have been extensively

examined in the context of organizational IS and E-commerce websites. Unfortunately, they have not been fully understood in the VC context. Furthermore, VC studies on IS quality have focused mainly on information quality, without taking system quality into consideration (Cheung et al. 2008; Gu et al. 2007).

Although Zhang (2010) investigated both information and system quality from multi-dimensional perspectives, this study differs from Zhang's paper as follows. First, we examine both intention to consume and intention to provide. Second, we use continuance intention as a proxy for continued participation, not frequency of usage, used by Zhang (2010). Third, this study investigates the impact of quality in information-exchange VCs instead of social networking sites as Zhang.

This study draws on two research streams to develop the model. The IS post-adoption literature helps us understand what factors directly affect users' intention to continue using a system. The IS Success research provides us a guideline to investigate system usage from a quality perspective. The integration of the two streams enables us to better understand the impacts of quality on users' future participation in VCs.

This study contributes to IS literature in the following ways. First, this is among a few studies to theorize the role of IS quality in users' continuance intention in the context of VCs. Second, this research investigates both information and system quality of VCs from a multi-dimensional perspective. To capture the uniqueness of VCs, an interactivity dimension of system quality is proposed based on existing research. Third, the model extends the original perceived usefulness construct to a more nuanced perceived individual benefits construct, which includes four types of individual benefits of participation in VCs.

The remainder of Study 1 is organized as follows. Section 2 presents current research on VCs that are relevant to this study. The theoretical background is presented in Section 3. We propose the research model in Section 4. Section 5 discusses methodology and data collection, followed by data analysis and results in Section 6. Discussion, contributions, limitations and future research are presented in Section 7 with the concluding remarks in Section 8.

## 2.2 Literature Review

### 2.2.1 User Participation in VCs

Users can participate in VCs in two ways: consuming information and providing information (Park et al, 2010). Similar to traditional IS, VC users can consume information by browsing or posting questions for help. They can also contribute information by replying to questions, and initiating or participating in a topic discussion in VCs. Ahuja and Galvin (2003) pointed out that information seeking and providing are the two effective ways to socialize with others in a virtual working group within an organization. These two behaviors indicate two intentions: intention to consume and intention to provide.

VC users can be grouped into lurkers and posters by their level of participation (Nonnecke et al. 2004; Preece et al. 2004; Ridings et al. 2006). Generally speaking, lurkers are those who visit a community simply for browsing without posting information. Posters are those who add to the threaded discussion and provide help to other members. In their study of 375 MSN bulletin board communities, Preece et al. (2004) suggested that a VC support browsing by providing effective tools for reading, finding and browsing community information for both lurkers and posters, and encourage

lurkers to post by rewarding quality and quantity of contribution. On the other hand, it is necessary to improve the system design for a better environment of communication and social interaction for both lurkers and posters.

In fact, researchers have agreed that information consuming and providing are indispensable parts of online communities (Park et al. 2010; Preece et al. 2004), as they are both desirable social behaviors in VCs (Ridings et al. 2006). Blanchard (2007) argued that user contribution is expected to make a VC survive and develop, only to the extent that the sheer volume of messages would not overwhelm the cognitive capacities of VC users.

In terms of continued participation in VCs, research on membership relationship has highlighted that users are expected to coproduce as well as consume products or services to maintain membership activities (Gruen et al. 2000). Thus, it is critical to understand these two types of participation behavior in VCs (Blanchard 2007).

### 2.2.2 Continued Participation in VCs

There are a number of VC studies that examine continued participation. Chen (2007) studied continuance intention in a professional VC for knowledge workers with C++ programming skills. He or she found that contextual factors (social interaction ties) and technological factors (knowledge quality and system quality) positively influence users' continuance intention to exchange knowledge in the future. Wang et al. (2008) examine users' continuance intention in Facebook. They found that computer self-efficacy affects Facebook users' continued usage through cognitive and affective decision processes. Perceived usefulness, perceived ease of use and arousal will enhance continuance intention to use Facebook. Similarly, in his study of social networking sites,

Zhang (2001) investigates the antecedents and outcomes of sense of community. He or she argued that sense of community is a significant factor in evaluating VC success, because it will motivate a user to use the services frequently to keep connected with his friends online.

By comparison, the investigation of continued participation in VCs in this study is different from the existing research and will add to IS literature on VC research. First, this study explicitly differentiates continuance intention to consume from continuance intention to provide. By separating these two intentions, we are able to provide better rationale for explaining each intention. Second, the research context of this study is different from Wang et al. (2008) and Zhang (2010)'s research. In their studies of social network sites, users are typically connected with friends or friends of a friend. They are familiar with each other or at least know each other in real life. The group could be a small or has a stable number of group members. Because they have been familiar with each other in real life before they keep the relationship online, trust and sense of belonging to the group could already be built up and strong. These naturally-developed factors will affect their perceptions of the site, their contributions and attachment to the group, further influencing their continued usage. However, in information-exchange VCs, users are typically connected with strangers. Mostly, they do not know each other in real life. The group could be unstable depending on whether the discussion topic is attractive and based on individual needs. In this context, users may be concerned about the quality of discussions, their privacy, others' contributions, user interaction, system performance, etc. The community needs to think about how to help users develop trust and sense of belonging and build a friendly environment that will motivate strangers to use and

contribute to the community. Given the differences between social networking sites and information-exchange VCs, it is expected that factors affecting continued participation vary. Third, although Chen (2007) used the same context as in this paper, our research perspective is different from his paper. Chen studied the impact of quality on continuance intention directly, while this study adds individual benefits of participation to explain the relationship. By incorporating this perspective, we are able to have a comprehensive view of why and how quality matters. Furthermore, this study contains more context-specific quality dimensions, such as interactivity of system quality, compared with Zhang's paper (2010).

### 2.2.3 Individual Benefits of Participating in VCs

Individuals are motivated to participate in VCs for a variety of reasons. According to the Social Exchange Theory (Emerson, 1976), people engage in social interaction in the hope that they can get some rewards back from the interaction. This suggests that individuals can be motivated to participate in a VC by receiving benefits from participation. A number of studies have examined different types of individual benefits that users can get from VCs. Butler et al (2002) summarized four types of individual benefits: information benefits, social benefits, visibility benefits, and altruistic benefits.

Information benefits include having access to useful information and expertise, receiving help by someone answering a question, and having unique sources of up-to-date information (Constant et al. 1996; Wasko and Faraj 2000 2005). Access to information is the most frequently cited reason for individuals to join a VC (Ridings et al. 2006; Ridings and Gefen 2004). Considered as valuable currency or social resources, the user-generated content is a source of content attractiveness that will draw more users to



the community (Hagel and Armstrong 1997; Ridings et al. 2006). In VCs that are open to the public for information exchange, users are more likely to receive information benefits as users are connected with each other with a diversity of background and expertise (Constant et al. 1996).

Social benefits refer to social and spiritual support that users can get through information exchange and user interaction (Wasko and Faraj 2000; Konana and Balasubramanian 2005). VCs are expected to create an environment for users to receive instrumental aid, companionship, encouragement and develop a sense of belonging (Butler et al. 2002; Ridings et al. 2006). For example, in health-related VCs, users can share their experiences on pregnancy, cancer or any other diseases or health issues. They are not only looking for information, but emotional support that can make them feel better and increase their confidence to go through this tough period.

Visibility benefits are achieved when a personal image or reputation is enhanced as a result of contributing knowledge to a VC or being socially active in a VC (Wasko and Faraj 2005). Visibility motivates people to participate in work-related online communities. People contribute their knowledge to the network “when they perceive that it enhances their professional reputations” (Wasko and Faraj 2005: pp. 35). Even in non-work-related VCs, users are more likely to contribute knowledge when they are recognized through IT artifacts (e.g., virtual copresence, user deep profiling, signature files) (Ma and Agarwal 2007).

Compared with the previous three types of benefits, which are about self-interests, altruistic benefits refer to the psychological happiness achieved through pro-social behaviors of helping others (Constant et al. 1996). In the presence of altruistic benefits,

users will feel happy and enjoy the process of helping others and promoting online discussions. Sometimes, users will feel obligated to give back to the VC that has given much to them (Blanchard and Markus 2004). As Butler et al. (2002: pp. 11) pointed out, “people want to contribute because they are trying to help the group itself or a larger community of people that the online group is part of.”

#### 2.2.4 The Importance of Quality in VCs

Research in VCs is multi-disciplinary. Relevant work has been done in various areas including psychology, sociology, and organizational science (Blanchard 2007; Constant et al. 1996). There are mainly two research streams that have highlighted the importance of quality in VCs. The first research stream examines VCs in an organizational context. Ahuja and Galvin (2003) revealed that employees can access a large volume of information with diverse topics in an Email-based VC. However, Finholt and Sproull (1990) found that, as the size of an email group increases, the number of both junk and useful emails increases. Constant et al. (1996) pointed out that the usefulness of an email network does not depend on the sheer number of emails; but instead, on the degree people can be connected with those offering useful and superior resources. Kettinger and Grover (1997) confirmed that perceived quality of communication contents predicts greater Email use. These organizational studies implied that information quality of a VC is equally important as information volume exchanged by employees at work.

With the emergence of Web 2.0 technology, the second research stream investigates VCs that provide open platforms for non-work-related discussions at the individual level. A number of studies focused on the impacts of membership size and information volume on user participation behaviors. By collecting communication

patterns of Listservs, Butler (2001) showed that membership size is positively related to member attraction, communication volume and topic variety. Gu et al. (2007) agreed that large VCs are expected to exhibit stronger positive network externalities because, other things being equal, there are more resources and information available than in smaller ones.

However, more does not always mean better. Butler (2001) found that an increase in membership size and information volume will discourage active participation and lead to membership loss. On one hand, it is more likely to see low-quality information in larger VCs, as it would be costly and difficult for them to control quality of posts generated by users (Gu et al. 2007). Useless information and undesirable communication activities may distract users' attention and waste their time and effort on information seeking and processing. Consequently, "information overload" will occur when users reach the maximum capability to cope with a large amount of electronic junk (Denning 1982), causing them to respond less accurately and adequately, or even quit (Jones et al. 2004).

Clearly, the amount of available resources on its own is not enough to retain users. To encourage continuous participation and contribution, VCs need to provide valuable resources and improve participation experiences.

Information quality is an important factor of VC success (Ridings et al. 2006). The value of a VC increases with the number of high-quality posts from the users' perspective, because high-quality posts help users to achieve individual benefits and satisfy individual needs (Gu et al. 2007). High-quality information makes users to scrutinize the presented information and works to incorporate it into personal knowledge

(Zhang and Watts, 2008). By adopting others' opinions, users are able to maximize their informational benefits. High-quality information also enhances the reputation of a VC and user loyalty, and can serve as a competitive weapon to attract and retain members (Lin, 2008).

The quality of a system can help to alleviate information overload and improve participation experiences (Jones et al. 2004). For instance, high system quality helps users to search for information and facilitates their participation effectively, while low quality leads to wasted time and efforts in locating information before participation. When a VC provides easy and flexible ways for users to browse/post information and interact with others, it will be more likely to encourage users' involvement, making participation interactive and enjoyable.

Overall, quality is believed to facilitate the process of transforming available resources to benefits for users, leading to a sustainable VC (Butler 2001; Butler et al. 2002). Without high-quality contents and good system design, a VC is not able to retain current users and anticipate their continued participation (Vatanasombut et al. 2008).

### 2.3 Theoretical Background

The research model is developed based on two research streams. The IS post-adoption literature helps us understand what factors directly affect users' intention to continue using an IS. The IS Success research provides a framework to investigate system usage from the quality perspective.

#### 2.3.1 IS Post-Adoption Research

The IS post-adoption literature extends the research on individual technology acceptance (Davis et al. 1989; Venkatesh et al. 2003) to examine user beliefs and

attitudes after initial IS use. A number of studies have shown that initial IS adoption and post-adoption are different, because perceptions and beliefs about IS usage change over time. The post-adoption research emphasizes user evaluation of IS performance and attitudes based on past experiences with the system. Karahanna et al. (1999) found that behavioral beliefs about using an IS (e.g., perceived usefulness) determine the intention to continue using it, whereas subjective norms from top management, supervisor and peers only influence an individual's decision on initial adoption, NOT continued usage in the later stage. Bhattacharjee (2001a) developed the IS continuance model in which perceived usefulness and user satisfaction are the two direct predictors of IS continuance intention. *Perceived usefulness* refers to a user's ex-post expectations about system effectiveness and the net benefits of system use (Bhattacharjee 2001a). *User satisfaction* is a user's emotional or psychological state following IT usage experience (Bhattacharjee 2001a; Davis et al. 1989). Following the same logic, Kim and Son (2009) found that perceived usefulness and satisfaction serve as mechanisms of commitment leading to continued usage of the same online service. Below is a summary of selected research on IS post-adoption (Table 3).

TABLE 3. Selected Empirical Research on IS Post-Adoption				
	Theory	Research Context	Independent Variables	Research Findings
Behavioral beliefs and attitudes toward IS continuance intention				
Parthasarathy and Bhattacharjee, 1998	<ul style="list-style-type: none"> <li>Innovation Diffusion Theory</li> </ul>	Online service	<ul style="list-style-type: none"> <li>Communication influence: external or interpersonal</li> <li>Utilization level</li> <li>perceived usefulness,</li> <li>ease of use</li> <li>compatibility</li> <li>network externalities</li> </ul>	<ul style="list-style-type: none"> <li>perceived usefulness of the online service can be one of the factors that differentiate continuers and discontinuers</li> <li>Ease of use is not a significant determinant of continuing the</li> </ul>

				service or not.
Karahanna et al., 1999	<ul style="list-style-type: none"> <li>• Theory of Reasoned Action</li> <li>• Innovation Diffusion Theory</li> </ul>	The use of Windows technology in an organization	<ul style="list-style-type: none"> <li>• Behavioral beliefs (e.g., perceived usefulness, ease of use, image, etc.)</li> <li>• Normative beliefs (e.g., top management, supervisor, peers, etc.)</li> <li>• Attitude</li> <li>• Subjective norm</li> </ul>	<ul style="list-style-type: none"> <li>• Experienced user intention is solely determined by attitudes toward continuing to use which are formed by perceived usefulness and image. Ease of use does not affect continuous intention.</li> <li>• Potential adopter intention is solely determined by normative pressures from top management, supervisor, peers, etc.</li> </ul>
Bhattacharjee, 2001	<ul style="list-style-type: none"> <li>• Expectation-Confirmation Theory</li> </ul>	Online banking	IS continuance model <ul style="list-style-type: none"> <li>• Perceived usefulness</li> <li>• Satisfaction</li> <li>• confirmation</li> </ul>	<ul style="list-style-type: none"> <li>• IS continuance intention is directly affected by perceived usefulness and user satisfaction</li> </ul>
Bhattacharjee, 2001	<ul style="list-style-type: none"> <li>• IS Continuance Model</li> </ul>	Online brokerage	<ul style="list-style-type: none"> <li>• Perceived usefulness</li> <li>• Satisfaction</li> <li>• Loyalty incentives</li> <li>• confirmation</li> </ul>	<ul style="list-style-type: none"> <li>• The result confirms the IS continuance model.</li> </ul>
Hong et al., 2006	<ul style="list-style-type: none"> <li>• TAM model</li> <li>• IS Continuance Model</li> </ul>	Mobile Internet	<ul style="list-style-type: none"> <li>• Perceived usefulness</li> <li>• Satisfaction</li> <li>• Perceived ease of use</li> <li>• confirmation</li> </ul>	<ul style="list-style-type: none"> <li>• The result confirms the IS continuance model and TAM model.</li> <li>• Perceived ease of use significantly affects continuance intention.</li> </ul>
Thong et al., 2006	<ul style="list-style-type: none"> <li>• TAM model</li> <li>• IS Continuance Model</li> </ul>	Mobile Internet	<ul style="list-style-type: none"> <li>• Perceived usefulness</li> <li>• Satisfaction</li> <li>• Perceived ease of use</li> <li>• Perceived</li> </ul>	<ul style="list-style-type: none"> <li>• The result confirms the IS continuance model and TAM model.</li> <li>• Perceived ease</li> </ul>

			enjoyment • confirmation	of use significantly affects continuance intention.
Kim and Malhotra, 2005	<ul style="list-style-type: none"> <li>• TAM</li> <li>• The theory of belief updating</li> <li>• Self-perception theory</li> <li>• Habit</li> </ul>		<ul style="list-style-type: none"> <li>• Perceived usefulness</li> <li>• Perceived ease of use</li> <li>• Past use</li> <li>• Intention to continue using</li> </ul>	<ul style="list-style-type: none"> <li>• The result confirms the IS continuance model and TAM model.</li> </ul>
Kim and Son, 2009	<ul style="list-style-type: none"> <li>• Social exchange theory</li> <li>• Loyalty</li> <li>• Switching cost</li> </ul>	Online portals	Dedication-based mechanism <ul style="list-style-type: none"> <li>• Perceived usefulness</li> <li>• Satisfaction</li> </ul> Constraint-based mechanism <ul style="list-style-type: none"> <li>• Personalization</li> <li>• Learning</li> </ul>	<ul style="list-style-type: none"> <li>• Perceived usefulness has a positive effect on continued usage intention, while user satisfaction does not.</li> </ul>

It should be noted that, contrary to the TAM model that postulates the dual impacts of perceived ease of use and perceived usefulness, perceived ease of use has been excluded from some IS-post adoption studies. The core premise is that perceived ease of use may become insignificant in predicting future use as an individual keeps using the system and gains experiences over time (Bhattacharjee 2001a, 2001b; Bhattacharjee and Premkumar 2004; Parthasarathy and Bhattacharjee 1998). Similarly, this study does not include *perceived ease of use*.

### 2.3.2 The IS Success Model

The IS Success model, initially developed by DeLone and McLean (1992), provides a clear taxonomy for conceptualizing and operationalizing IS success. The model includes six categories of IS Success: information quality, system quality, use, user satisfaction, individual impact and organizational impact. Information quality refers to the quality of the information that the system produces. System quality measures the

information processing system itself. Use means actual use in terms of duration, frequency and intensity. User satisfaction represents an individual's overall attitudes toward the system usage. Individual impact indicates the effect of an IS on the behavior of the recipient, such as a better understanding of the decision context, improving his decision-making productivity, a change in user activity, or a change in his perception of the importance or usefulness of the system. Organizational impact refers to the effect of an IS on organizational performance in terms of operational performance, financial performance and marketing performance.

Since the inception of the IS Success model, a number of studies have empirically validated this framework in a variety of contexts (Agarwal and Prasad, 1997; Clemons *et al.*, 1993). In the updated version of IS Success model, individual impact and organizational impact are collapsed into one construct, called net benefits. Service quality is added as another dimension to reflect the effectiveness of service provider, such as the IS department of an organization (e.g., up-to-date hardware and software, prompt service to users, etc.) or an e-commerce system (e.g., usability, availability, reliability, etc.). DeLone and McLean (2003) emphasized that the linkages among success dimensions are at a process sense, not a causal sense. The casual relationships among selected success dimensions should be contingent on the objectives and context of the empirical investigation.

The integration of the IS post-adoption literature and IS Success model enhances our understanding of the role of quality in usage intention in the IS post-adoption stage . Traditional IS post-adoption research has widely agreed that continuance intention is directly determined by affective characteristics of the system such as perceived



usefulness and user satisfaction based on past usage experiences (Bhattacharjee 2001a, 2001b; Karahanna et al. 1999; Kim and Son 2009). However, as the focus of this study is to understand the impact of quality on continuance intention, the IS post-adoption research does not specifically discuss the role of quality. Hence, we refer to the IS Success model that pinpoints the primary role of quality and incorporate quality into the post-adoption usage in our model. Although the IS Success model looks at intention to use/use, it mostly focuses on initial adoption or actual usage in terms of frequency and depth of use. It does not explicitly explain user decision making on continued usage. In addition, as DeLone and McLean (2003) emphasized, the IS Success model is a taxonomy based on a process model of IS. As a result, the IS Success model alone may not be sufficient to explain casual relationships for post-adoption. In these regards, we need to integrate the two streams as the theoretical foundations for studying post-adoption in a comprehensive way.

#### 2.4 Hypotheses Development

In this study, we examine two types of continuance intentions: *continuance intention to consume* and *continuance intention to provide*. *Continuance intention to consume* represents the extent to which a user intends to continue browsing or seeking information in a VC. *Continuance intention to provide* refers to the extent to which a user intends to continue contributing his knowledge by replying to other users' comments/messages or by participating in topic discussions.

Based on the IS post-adoption literature, we propose that *perceived individual benefits* and *user satisfaction* are the two direct antecedents that will influence existing users' *continuance intention to consume* and *continuance intention provide* in a VC.

According to the IS Success research, we argue that *perceived information quality* and *perceived system quality* are the primary factors that affect individual benefits and attitudes toward the system, ultimately leading to continuance intention in a VC. Below is the research model in Figure 1.

This study does not consider service quality, which captures the quality of typical service-related activities provided by IS departments at organizations (e.g., IS training and support) or E-commerce websites (e.g., order tracking, return). The reason is that the quality of most services provided by an information-exchange VC can be encompassed in either information or system quality. In addition, active involvement from VC managers is limited in VCs examined in this study.

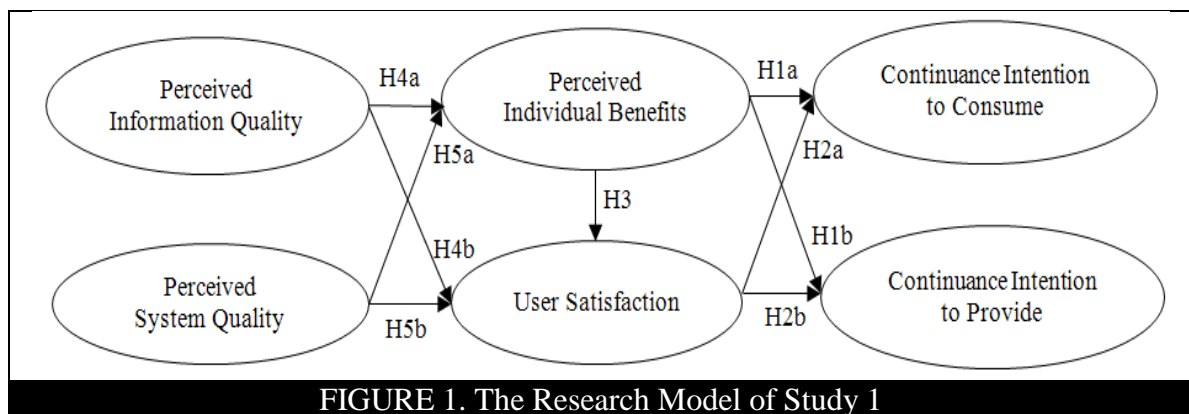


FIGURE 1. The Research Model of Study 1

#### 2.4.1 Determinants of Continuance Intention in VCs

In our research, *continuance intention to consume* represents the extent to which a user intends to continue browsing or seeking information in a VC. The user can simply search relevant information or post questions to be answered by other users. *Continuance intention to provide* refers to the extent to which a user intends to continue contributing his knowledge by replying to other users' comments/messages or initiating topic discussions.

According to the IS post-adoption research, users' perceptions of the system usefulness directly influence their future participation intention. The IS post-adoption research uses *perceived usefulness* to represent individual benefits of system usage. In order to enrich and extend perceived usefulness and net benefits in VCs, we use the term *perceived individual benefits* and define it as the extent to which an individual perceives a VC to be useful in fulfilling his needs and desires based on past experiences (Davis et al. 1989; Bhattacharjee 2001a). This construct captures various user benefits discussed in Section 2: informational, social, visibility and altruistic benefits.

The individual benefits of system usage have been well understood in organizations and traditional E-commerce websites, but less understood in the VC context. According to the IS post-adoption research, net benefits are a major determinant of continuance intention to use the system. Agarwal and Karahanna (2000) demonstrated that users enjoy fun interactions with the website that arouse their imagination (social benefits), leading to an intention to revisit the website. In a lab experiment, Jiang and Benbasat (2007) showed that when an online website can provide useful product information (information benefits), they are more likely to repurchase.

In an information-exchange VC, a user's primary goal is to access information either by purely browsing information or by participating in a discussion with other users. During the process of information sharing, users can receive not only information, but also social support and recognition within the community (Blanchard and Markus 2004). Moreover, a voluntary behavior of helping others will occur when users enjoy contributing to the VC to benefit others. So, information exchange could be more than a learning process. When users can benefit from information sharing, social support and

voluntary contribution, their sense of community will be enhanced (Blanchard and Markus 2004). As a result, this will greatly motivate users' involvement and active participation in the VC in the future.

In addition, according to the Social Exchange Theory (Emerson 1976), information exchange in VCs is a reciprocal process. When users can obtain useful information and social support from others in a VC, they may be motivated to help others as a return of what they have received. On the other hand, users who provide information may also expect to receive help and access to superior resources from others. It is found that active users who provide information or participate in discussion will feel discouraged if they cannot get useful information and responses from the community (Lim 2008). Thus, it is expected that perceived individual benefits will motivate two-way participation, as hypothesized:

**H1a:** *Perceived individual benefits of participating in the VC are positively associated with users' continuance intention to consume in the VC.*

**H1b:** *Perceived individual benefits of participating in the VC are positively associated with users' continuance intention to provide in the VC.*

*User satisfaction* is an individual's emotional or psychological state following VC usage experiences (Bhattacharjee 2001a; Davis et al. 1989). Based on the IS post-adoption research, user satisfaction is a salient attitude factor that impacts the intention to continue using a system. Parthasarathy and Bhattacharjee (1998) found that continuers are more satisfied with the online services than discontinuers. In the context of VCs, participation experiences allow users to evaluate the VC in terms of content quality, interaction with other users, etc. The more satisfied a user is based on that evaluation, the

more likely he or she will continue participating in the same VC because he or she knows that the VC can meet his personal needs. Maintaining user satisfaction is an important aspect of VC sustainability (Chen 2007). Given the severe competition among VCs and low switching cost, if a user is not satisfied with an VC, he or she can freely reduce his participation or terminate his membership and switch to another VC that can better satisfy him (Gu et al. 2007; Jones et al. 2004). Hence, we hypothesize that:

**H2a:** *Users' level of satisfaction with participation experiences in the VC is positively associated with their continuance intention to consume in the VC.*

**H2b:** *Users' level of satisfaction with participation experiences in the VC is positively associated with their continuance intention to provide in the VC.*

According to the IS post-adoption research, individual benefits that are perceived by users will positively influence their post-adoption attitudes toward the system. In fact, positive perceptions about individual benefits enhance users' satisfaction and motivate them to continue participating (Sangwan, 2005). Therefore, we posit that:

**H3:** *Perceived individual benefits of participating in the VC are positively associated with users' level of satisfaction with participation experiences in the VC.*

#### 2.4.2 The Role of Information Quality and System Quality

*Perceived information quality* is an individual's evaluation of the system's performance in providing information based on his experience of using the system (McKinney et al. 2002; Nelson et al. 2005).

The issue of information quality in a VC has been raised by a number of IS researchers but has not been fully investigated yet. Gu et al. (2007) pointed out that low-quality information is distracting because it increases users' search and information-

processing costs. Users could waste their time and efforts on reading useless posts. For example, irrelevant information takes the discussion off the topic. Information that is out of date makes it more difficult for users to be able to find valuable information. Information from an unreliable or commercial-based source may be biased and may mislead a discussion. In fact, users will benefit from VC participation only when a VC provides information valued by them, encouraging high-quality discussion and knowledge sharing (Butler, 2001). High-quality posts and discussion will help users to have a better understanding of the topic, feel support from others and make a better decision (Weiss et al. 2008).

High quality not only benefits users who want to obtain useful information and get advice on a particular topic, but also users who provide information. For example, by providing valuable information, a user can help more people who need information and increase his reputation and personal image in the community (Butler et al. 2002). Thus, we believe that information quality plays an important role in creating various benefits to users. To this end, we posit that:

**H4a:** *Perceived information quality of the VC is positively associated with perceived individual benefits of participating in the VC.*

In an information-exchange VC, user valuation of a VC largely depends on the quality of posts (Ridings et al. 2006). In order to satisfy VC users, a VC needs to take continuous efforts on providing high-quality contents, as the goodness of contents directly affects users' attitudes toward an VC (Butler 2001; Sangwan 2005). Thus, we hypothesize that:

**H4b:** *Perceived information quality of the VC is positively related to users' level of satisfaction with prior participation experiences in the VC.*

*Perceived system quality* represents an individual's evaluation of the performance of system features based on his experience of using the system (McKinney et al. 2002; Nelson et al. 2005) According to the IS Success Model, system quality is an important factor in evaluating IS success, in addition to information quality.

An active VC can generate a large volume of posts every day. On one hand, a large volume of posts increases the likelihood of finding information a user wants. On the other hand, the large volume of information may place burden on users to process information. Due to the limited information-processing capability of human beings, information overload will occur when the volume overwhelms the cognitive capacities of users (Blanchard, 2008). As a response to information overload, users tend to post less complex messages, more responses to simple messages, and reduce, or even end, active participation (Jones et al. 2004).

Markus (2005) argued that technological features are critical in supporting user interaction online, and further the success of a VC. Examples of technological features include the ability to organize and archive messages, the ability to communicate both publicly and privately, and the ability to track other members' participation (e.g., time on the group, number and types of messages, the ability to detect if others are currently in the community) (Blanchard 2008).

Indeed, a VC is expected to design the system so that users are able to efficiently and effectively access information and participate in group discussion (Blanchard 2007; Ma and Agarwal 2007). To minimize information overload, a VC should provide clear

and well-organized navigation and search tools that allow users to locate information or post messages efficiently, and reduce their search and communication costs (Gu et al. 2007). Filtering techniques can also be implemented, giving users flexibility of blocking junk information and filtering out irrelevant information (Jones et al. 2004). A VC may also implement reward mechanisms to increase users' visibility and acknowledge their contributions, which will motivate users to participate. Appropriate system features (e.g., virtual copresence and personal profiling) could facilitate user interaction and knowledge contribution (Jones 1997; Ma and Agarwal 2007).

Overall, an effective system should enable users to obtain information they want efficiently, facilitate user interaction and encourage user contribution. When the system makes participation easy, enjoyable and valued by the community, users are more likely to maximize their benefits of participation and be satisfied with a VC. Thus, we posit that:

**H5a:** *Perceived system quality of the VC is positively associated with users' perceived individual benefits of participating in the VC.*

**H5b:** *Perceived system quality of the VC is positively related to users' level of satisfaction with participation experiences in the VC.*

#### 2.4.3 Control Variables

Consistent with research on individual technology acceptance, a number of control variables such as age, gender, education, tenure, and average hours spent per week were included to test their effects on continuance intention (Limayem et al. 2007; Ma and Agarwal 2007; Srite and Karahanna 2006; Venkatesh and Morris 2000; Venkatesh et al. 2003).



## 2.5 Research Methodology

### 2.5.1 Data Collection

A web-based survey was used to validate the model. Two VC managers and several VC researchers reviewed the initial survey prior to data collection. Pilot studies were conducted in a sports forum (KarateForums.com) and a graduate-student VC (GradShare). Based on 54 responses, we revised the survey to make sure that the items could be correctly understood.

We collected data from existing users in a large travel-related VC (Site A<sup>1</sup>). Site A is one of the largest VCs for travelers to share world-wide travel-related information or experiences in its travel forums. The forums are organized by destination, such as United States Forums and Europe Forums. In the category of United States Forums, there is a list of forums titled Alabama, North Carolina, etc. Users can participate in discussion in on existing topic or create a new topic in each forum. Site A provides a platform for individuals to share traveling information. Users are free to participate in any topic discussions they want. They are not forced to participate by any incentives from the community (e.g., financial).

The manager of Site A posted the survey as a sticky link at the top of each discussion forum. The manger we contacted with is responsible for daily operations of the travel forums. 284 users participated in the survey during the two days at the end of May 2009, with 3 responses excluded from the analysis due to missing data. The total sample size was 281. According to Chin and Newsted (1999), the minimum sample size should be ten times the construct with the largest number of indicators. Given that

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<sup>1</sup> We cannot reveal the name of Site A, due to a confidentiality agreement with the community managers.

perceived information and system quality are formative second-order constructs with 17 items respectively, the minimum sample size 170 is sufficient to validate the model.

Table 4 presents the demographic profile of the respondents. It indicates that more women (60%) participated in the survey than men (40%). The majority of respondents (approximately 71%) are between 31 and 60 years old and well-educated (approximately 63% of the total with college-level backgrounds or higher). More than half of the respondents have been members of Site A for 2-5 years. 80% of the respondents spend less than 10 hours every week in the VC.

Site A (N=281)							
Gender		Tenure		Education		Hours/week	
Male	40.9%	First time	0.4%	High school	8.5%	<5 hours	53.7%
Female	59.1%	<6 months	10.0%	Vocational	5.7%	5-10 hours	28.1%
Age		<1 year	6.4%	Some college	24.2%	10-20 hours	12.5%
18-30	10.0%	1-2 years	21.4%	Bachelor	33.5%	>20 hours	5.7%
31-40	39.5%	2-5 years	53.4%	Master or PhD	24.9%		
41-60	26.3%	>5 years	8.5%	Others	3.2%		
>60	14.2%						

### 2.5.2 Instrument Development

Whenever possible, measurement items were adopted from prior research and measured by a 5-point Likert scale (1-strongly disagree, 5-strongly agree). Several items were newly developed based on relevant literature.

Information quality is considered a multi-dimensional concept, measured by accuracy, believability, timeliness, etc. (Lee et al. 2002). Wang and Strong (1996) developed a comprehensive conceptual framework of data quality. Agarwal and Prasad (1997) included information usefulness and relevancy as key IT innovation characteristics to predict users' future use of the web at work. Nelson et al. (2005) used information completeness, accuracy and format as important determinants of information satisfaction with data warehousing projects. Grounded on the TAM model (Davis et al.

1989), Ahn et al. (2007) indicated that information accuracy, timeliness, reliability and completeness are positively associated with user evaluation of online retailing sites.

Building on prior research, information quality was modeled as a higher-order construct formed by six dimensions that are important in the VC context (Wixom and Todd 2005) (Table 5). While multiple dimensions are incorporated in the model, the importance of each dimension may vary.

As each quality dimension represents a portion of the overall quality, *perceived information quality* is modeled as a second-order formative construct (Petter et al. 2007). The dimensions of information quality include *reliability*, *objectivity*, *relevancy*, *timeliness*, *richness* and *format*. All of the dimensions except *richness* are modeled as reflective first-order constructs. The *richness* dimension is a formative first-order construct, capturing both information volume and depth.

TABLE 5. Proposed Dimensions of Information Quality in VCs		
Dimension	Definition	References
Reliability	The extent to which information is regarded as true, believable and credible	McKinney et al. 2002 Wang and Strong 1996
Objectivity	The extent to which information is unbiased, unprejudiced, and impartial	Lee et al. 2002
Relevancy	The extent to which information is beneficial and provides advantages from its use	Lee 2003-4 McKinney et al. 2002
Timeliness	The extent to which information is sufficiently up-to-date for the task at hand	Lee et al. 2002 Lee and Strong 2003-4
Richness	The extent to which information is enough for fulfilling a specific need	Lee et al. 2002 McKinney et al. 2002
Format	The extent to which information is presented in a way that is easy to understand.	Lee et al. 2002

System quality is another quality dimension that has been explored in both organizational and individual contexts. It represents how users evaluate their interaction with IT features of the system (Nelson et al. 2005). Similar with information quality, system quality is treated as multifaceted in nature, measured by navigation, content

organization, accessibility, etc. (Yang et al. 2005, Wixom and Todd 2005). At the organizational level, researchers have investigated the positive impacts of system accessibility, compatibility and reliability on IS implementation. Wixom and Watson (2001) confirmed the IS Success Model by investigating the success factors of a data warehouse implementation (e.g., flexible response, data integration). At the individual level, system quality is evaluated by website design aspects, such as navigation, content organization, security, etc. (Agarwal and Venkatesh 2002; McKinney et al. 2002).

From the literature on system and website quality (Ma and Agarwal 2007; McKinney et al. 2002), we identified 5 dimensions that form the second-order construct *perceived system quality: navigation, accessibility, appearance, security and interactivity* (Table 6). All of the dimensions except *interactivity* are modeled as reflective first-order constructs. In particular, previous research used *interactivity* to evaluate B2C websites (McKinney et al. 2002; Palmer 2002). To reflect the VC setting that allows personal interactions among users, we developed the items for *interactivity* to capture various interactive IT features that facilitate direct user interaction, a unique but prevalent dimension in the VC context. The use of one feature does not imply the use of another one. So, they jointly determine *interactivity* of a VC, which is modeled as a formative construct.

<b>TABLE 6. Proposed Dimensions of System Quality in VCs</b>		
<b>Dimension</b>	<b>Definition</b>	<b>References</b>
Navigation	The degree to which a user can easily go back and forth within the VC	McKinney et al. 2002 Yang et al. 2005
Accessibility	The degree to which the system and the information it contains can be accessed with relatively low effort	Lee et al. 2002 McKinney et al. 2002 Nelson et al. 2005
Appearance	The degree to which the system is visually attractive and appropriate	McKinney et al. 2000
Security	The extent to which a user's information is protected and access to personal information	Yang et al., 2005

	is restricted	
Interactivity	The degree to which the system can facilitate direct user interaction in an VC	Ma and Agarwal 2007 McKinney et al. 2002 Palmer 2002

*Perceived individual benefits* is proposed as a formative construct. It is composed of four types of individual benefits: information, social, visibility, and altruistic benefits. There are a number of studies that have explored the benefits of participating in VCs (Butler et al. 2002; Ma and Agarwal 2007; Wasko and Faraj 2000, 2005), but studies empirically validating and testing those benefits are limited. To ensure face validity of the *perceived individual benefits* construct, we conducted an extensive literature review and consulted with senior researchers and community managers

*Continuance intention to consume* and *continuance intention to provide* are both reflective constructs. Respondents were asked to indicate their intention to continue consuming information through behaviors such as browsing, seeking information and posting questions. Similarly, respondents were asked to indicate their intention to continue providing information such as posting messages, initiating or participating in topic discussions.

*User satisfaction* is a reflective construct and measured by validated items (Bhattacharjee, 2001a; Davis et al, 1989). All control variables are measured by single-item questions. The survey items are provided in Appendix A.

Below is a summary of key constructs used in the survey (Table 7). The survey items are provided in Appendix A.

TABLE 7. A Summary of Constructs Used in the Survey of Study 1

Construct	Definition	First-order Constructs	Supporting Literature	Comment
Perceived Information Quality	an individual's evaluation of the system's performance in providing information based on his experience of using the system	Reliability; Objectivity; Usefulness; Timeliness; Format; Richness (F) <sup>2</sup>	Kahn et al. 2002; Lee et al. 2002; McKinney et al. 2002; Wang and Strong 1996;	
Perceived System Quality	an individual's evaluation of the performance of system features based on his experience of using the system	Navigation; Accessibility; Appearance; Security; Interactivity (F)	Liu and Arnett 2000; Ma and Agarwal 2007; McKinney et al. 2002; Nelson et al. 2005; Yang et al. 2005; Lee et al. 2002	Newly-developed items for <i>Interactivity</i>
Perceived Individual Benefits	the extent to which an individual perceives an VC to be useful in fulfilling his needs and desires based on past experiences	N.A.	Bhattacharjee 2001a; Wasko and Faraj 2000 2005; Constant et al. 1996; Butler et al. 2002	Newly-developed items
User Satisfaction	an individual's emotional or psychological state following VC usage experiences	N.A.	Churchill and Surprenant 1982; Bhattacharjee 2001; McKinney et al. 2002	
Continuance Intention to Consume	the extent to which a user intends to continue browsing or seeking information in an VC	N.A.	Bhattacharjee 2001a; Butler et al. 2002; Gruen et al. 2000; Ridings et al. 2006	
Continuance Intention to Provide	the extent to which a user intends to continue contributing his knowledge by replying to other users' comments/messages or by participating in topic discussions	N.A.	Bhattacharjee 2001a; Butler et al. 2002; Gruen et al. 2000; Ridings et al. 2006	

## 2.6 Data Analysis and Results

SPSS was used to prescreen the dataset and did not find univariate normality, linearity or multicollinearity problems. The PLS-based structural equation modeling (SEM) technique (SmartPLS 2.0, developed by Ringle et al. 2005) was used to validate the model (Chin 1998). PLS is appropriate when the model contains both formative and reflective constructs (Chin 1998). Moreover, as the proposed model is multistage, SEM

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<sup>2</sup> F: formative first-order

provides researchers with the flexibility to model multiple predictors, latent variables and measurement errors (Chin et al. 2003).

### 2.6.1 Measurement Model

We ran a confirmatory factor analysis in SmartPLS 2.0 and assessed reliability, convergent validity and discriminant validity for the reflective constructs. We also followed the procedures used in Petter et al.'s (2007) paper to validate the formative constructs: richness, interactivity and perceived individual benefits.

Reliability is evaluated by computing AVE (Average Variance Extracted), CR (Composite Reliability) and Cronbach's alpha (Bagozzi and Yi 1988). The AVE measures the amount of variance that a construct captures from its indicators relative to the amount due to measurement error (Wasko and Faraj 2005). The CR and Cronbach's alpha are the measures of internal consistency. Although CR and Cronbach's alpha are similar, the former takes into account actual loadings of construct factor scores, which is a better measure of internal consistency (Ma and Agarwal 2007). 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; Fornell and Larcker 1981). Table 8 summarizes the reliability results for the reflective first-order constructs. Although two constructs (timeliness and accessibility) have Cronbach's Alpha slightly lower than 0.7, all the AVEs and CRs are above the cut-off values, indicating that all of the reflective items are reliable.

Convergent validity reflects the extent to which the items for each construct are measuring the same construct. If the factor loading of an item on its designated construct is 0.60 or more, convergent validity is established (Chin et al. 1997; Kim and Son 2009). Table 8 shows that all the items meet this requirement and are significant at the 1% level.

TABLE 8. Reliability, Internal Consistency and Convergent Validity of Study 1							
Second-order Construct	First-order Construct	AVE	CR (Composite Reliability)	Cronbach's Alpha	Items	Parameter Estimate	T value
Perceived Information Quality	Reliability	0.57	0.84	0.75	Reli1	0.78***	19.92
					Reli2	0.78***	21.71
					Reli3	0.64***	13.48
					Reli4	0.81***	27.51
	Objectivity	0.77	0.87	0.70	Objel	0.87***	39.13
					Obje2	0.88***	36.59
	Value-added	0.79	0.88	0.73	Usef1	0.89***	46.59
					Usef2	0.89***	27.78
	Timeliness	0.71	0.83	0.59	Time1	0.82***	25.18
					Time2	0.86***	31.79
	Richness <sup>34</sup>	N.A.	N.A.	N.A.	Rich1	0.46***	5.04
					Rich2	0.48***	5.86
					Rich3	0.50***	7.03
Format	0.57	0.84	0.74	Form1	0.82***	38.65	
				Form2	0.67***	9.16	
				Form3	0.70***	14.44	
				Form4	0.81***	30.76	
Perceived System Quality	Navigation	0.66	0.91	0.87	Navi1	0.86***	43.21
					Navi2	0.77***	22.68
					Navi3	0.87***	45.22
					Navi4	0.84***	44.40
					Navi5	0.71***	17.31
	Accessibility	0.56	0.79	0.61	Acce1	0.81***	32.35
					Acce2	0.74***	18.77
					Acce3	0.70***	15.96
	Appearance	0.62	0.83	0.70	Appe1	0.82***	30.90
					Appe2	0.72***	28.81
					Appe3	0.81***	15.14
	Security	0.63	0.84	0.71	Secu1	0.81***	25.45
					Secu2	0.83***	33.52
Secu3					0.74***	17.18	
Interactivity	N.A.	N.A.	N.A.	Inte1	0.41***	6.59	
				Inte2	0.32***	5.19	
				Inte3	0.62***	9.41	
Perceived Individual Benefits	N.A.	N.A.	N.A.	NB1	0.20***	7.11	
				NB2	0.56***	4.46	
				NB3	0.33**	2.35	
				NB4	0.17***	2.71	
User Satisfaction	0.90	0.97	0.95	Satis1	0.96***	147.73	
				Satis2	0.95***	100.42	
				Satis3	0.94***	98.25	

<sup>3</sup> *Richness*, *Interactivity* and *Perceived Individual Benefits* are formative constructs. According to the literature on the formative construct, internal consistency and reliability check is not important and necessary (Petter et al. 2007).

<sup>4</sup> Rich1, Rich2, Rich3, Inte1, Inte2, Inte3, NB1, NB2, NB3, NB4: We report the weight for each item of the *Richness* and *Interactivity* dimension as a formative first-order construct and each item of *Perceived Individual Benefits* as a formative construct.



Continuance Intention to Consume	0.85	0.94	0.91	InfoCon1	0.94***	74.77
				InfoCon2	0.95***	99.83
				InfoCon3	0.87***	38.36
Continuance Intention to Provide	0.83	0.94	0.90	InfoPro1	0.91***	61.06
				InfoPro2	0.89***	52.25
				InfoPro3	0.94***	83.37
*** Significant at the 1% level of significance    ** Significant at the 5% level of significance * Significant at the 10% level of significance						

Discriminant validity reflects the extent to which constructs are significantly different from each other. It is assessed by examining if the correlation between a pair of constructs is less than the squared root of AVE of each construct (Chin 1998; Fornell and Larcker 1981). Table 10 shows that all of the squared roots of AVEs on the main diagonal are greater than the pairwise correlations between constructs on the off diagonal, implying that all constructs are distinct. In addition, we checked item cross-loadings based on the SmartPLS results. Each item loads higher on its designated construct than other constructs and the cross-loading differences are higher than the suggested threshold of 0.10 (Gefen and Straub 2005; Hsieh et al. 2008). As a result, there are no severe cross-loading problems in the scale items.

Furthermore, three formative first-order constructs (richness, interactivity and perceived individual benefits) were validated following the guidelines by Petter et al. (2007). Unlike reflective constructs, we do not expect high correlations among items of a formative construct, because each item accounts for a unique part of the construct (Petter et al. 2007). We ran two correlations: one is among the formative items for each construct; the other is between these formative items with other reflective items. Table 9 shows that the correlation among each pair of items is low for each construct (0.3-0.6). The highest correlations between Rich1, Rich2, Rich3, Inte1, Inte2, Inte3, PIB1, PIB2, PIB3, PIB4 and other items were around 0.3-0.6 respectively. Since each item accounts

for a unique part of the construct, we do not expect multicollinearity of a formative construct. From Table 9, there is no multicollinearity problem as all the VIF are less than 3.3 (Diamantopoulos and Winklhofer, 2001).

In terms of construct validity, we checked the item weights. As shown in Table 8, all of the weights are significant at the 1% or 5% level. Therefore, all three formative constructs are reliable and valid.

<b>TABLE 9. Reliability of the Formative Constructs of Study 1</b>									
<b>Richness</b>					<b>Interactivity</b>				
	Correlation			VIF		Correlation			VIF
	Rich1	Rich2	Rich3			Inte1	Inte2	Inte3	
Rich 1	1.00			1.078	Inte1	1.00			1.135
Rich 2	0.20	1.00		1.098	Inte2	0.30	1.00		1.195
Rich 3	0.23	0.26	1.00	1.111	Inte4	0.26	0.34	1.00	1.162
<b>Perceived Individual Benefits</b>									
	Correlation				VIF				
	NB1	NB2	NB3	NB4					
NB1	1.00				1.746				
NB2	0.63	1.00			1.811				
NB3	0.46	0.48	1.00		1.580				
NB4	0.30	0.36	0.48	1.00	1.339				

**TABLE 10. Discriminant Validity of the Key Constructs of Study 1**

	Mean	S.D.	AVE	Re	Ob	Va	Ti	Ri	Fo	Na	Ac	Ap	Se	In	NB	US	CIC	CIP
Reliability	3.41	0.57	0.57	0.75 <sup>5</sup>														
Objectivity	2.98	0.83	0.77	0.54	0.88													
Value-added	4.15	0.58	0.79	0.49	0.32	0.89												
Timeliness	3.9	0.65	0.71	0.5	0.27	0.52	0.84											
Richness	3.86	0.57	NA	0.52	0.28	0.53	0.53	NA										
Format	3.64	0.63	0.74	0.59	0.5	0.33	0.42	0.55	0.86									
Navigation	3.62	0.7	0.66	0.36	0.24	0.29	0.37	0.45	0.47	0.81								
Accessibility	3.65	0.6	0.56	0.35	0.23	0.34	0.37	0.44	0.45	0.71	0.75							
Appearance	3.53	0.76	0.62	0.33	0.24	0.28	0.39	0.41	0.46	0.71	0.63	0.79						
Security	3.74	0.58	0.63	0.48	0.33	0.32	0.35	0.47	0.39	0.48	0.48	0.39	0.79					
Interactivity	3.72	0.61	NA	0.32	0.28	0.35	0.39	0.51	0.46	0.61	0.53	0.57	0.49	NA				
Net Benefits	4.07	0.64	NA	0.5	0.31	0.62	0.43	0.53	0.4	0.44	0.46	0.38	0.55	0.48	NA			
User Satisfaction	4.11	0.77	0.9	0.58	0.37	0.59	0.48	0.57	0.52	0.53	0.53	0.5	0.59	0.5	0.76	0.95		
Continuance Intention to Consume	4.41	0.67	0.84	0.45	0.28	0.52	0.36	0.47	0.39	0.37	0.38	0.32	0.52	0.45	0.73	0.72	0.92	
Continuance Intention to Provide	4.06	0.84	0.83	0.35	0.2	0.35	0.27	0.35	0.32	0.26	0.32	0.24	0.44	0.3	0.54	0.58	0.68	0.91

5. The square root of AVE of every multi-item construct (first-order and second-order) is shown on the main diagonal.

## 2.6.2 Structural Model

SmartPLS 2.0 was used to test the structural model and hypotheses. A bootstrapping procedure with 500 iterations was performed to examine the statistical significance of the weights of sub-constructs and the path coefficients (Chin 1998). As PLS does not generate overall goodness of fit indices, the  $R^2$  is the primary way to evaluate the explanatory power of the model (Wasko and Faraj 2005).

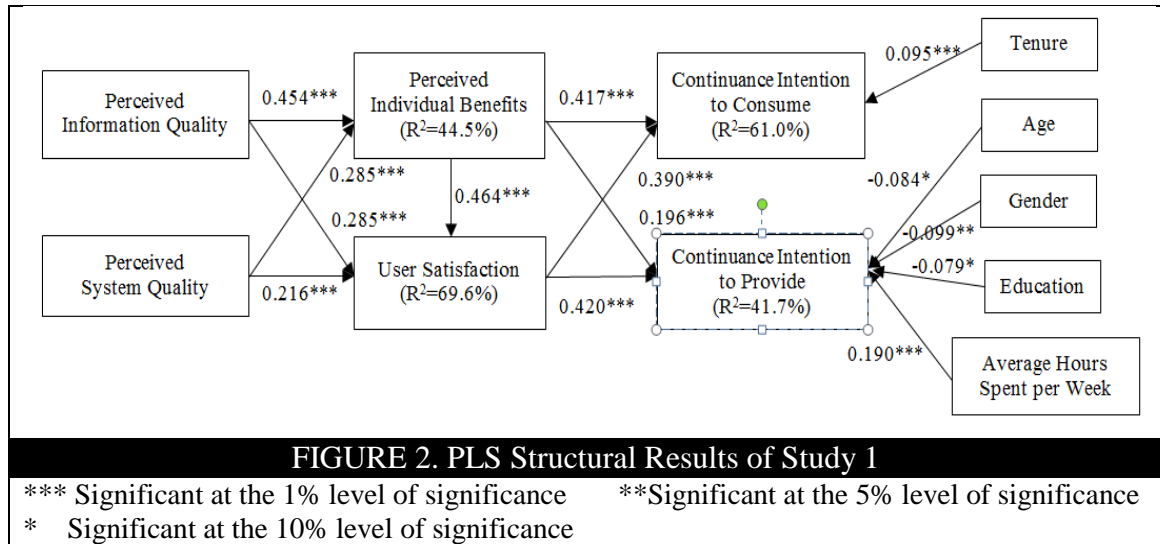
The results in Table 11 indicate that all dimensions of the second-order constructs *perceived information quality* and *perceived system quality* are significant at the 1% level. Based on the weights, information *reliability* and *format* are the two most important dimensions of information quality perceived by users. In terms of system quality, users are more concerned about site *navigation* and *security* of personal information.

<b>Second-order Construct</b>	<b>First-order Construct</b>	<b>Weight</b>	<b>T value</b>
Perceived Information Quality	Reliability	0.315***	16.88
	Objectivity	0.148***	11.67
	Value-added	0.215***	10.79
	Timeliness	0.164***	9.63
	Richness	0.193***	12.26
	Format	0.287***	11.24
Perceived System Quality	Navigation	0.417***	22.09
	Accessibility	0.199***	17.10
	Appearance	0.204***	14.18
	Security	0.220***	12.77
	Interactivity	0.180***	15.12

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

Figure 2 below summarizes the results of the path analysis. With all the paths significant at the 1% level, the hypothesized relationships are supported. User satisfaction and perceived individual benefits jointly explain 60.9% of the variance in the continuance

intention to consume information, and 38.3% of the variance in the continuance intention to provide information. As hypothesized, information quality and system quality are the two direct factors that affect users' net benefits ( $R^2=40.9\%$ ) obtained from participating in Site A. User satisfaction ( $R^2=68.9\%$ ) depends largely on perceptions of information quality, system quality and individual benefits.



Regarding model validity, Chin (1998) suggested that we use  $R^2$  values of 0.67, 0.33, or 0.19 to describe the endogenous latent variables as substantial, moderate or weak respectively. Accordingly, user satisfaction ( $R^2=0.696$ ) is described as strong, while perceived individual benefits ( $R^2=0.445$ ), continuance intention to consume ( $R^2=0.61$ ) and continuance intention to provide ( $R^2=0.417$ ) as moderate. In addition, Henseler et al. (2009) argued that effect size of a variable can be determined by the  $f^2$  value with 0.02, 0.15 and 0.35 as weak, medium, or large effect at the structural level. For this study, the model has approximately large effect size for perceived individual benefits ( $f^2=0.80$ ), user satisfaction ( $f^2=2.29$ ), continuance intention to consume ( $f^2=1.56$ ) and continuance intention to provide ( $f^2=0.72$ ).

### 2.6.3 Mediating Effects

We followed Baron and Kenny's procedures (1986) to test two mediating effects: 1. the mediating role of perceived individual benefits and user satisfaction; 2. the mediating role of user satisfaction in the model. Similar to Ma and Agarwal (2007), two additional analyses were run for the mediating effect 1. In the first analysis, we removed perceived individual benefits and user satisfaction from the model and tested the direct impacts of the two quality dimensions on two continuance intentions. The second analysis included both direct and mediated paths. Table 12 indicates that there are significant direct relationships between the two quality dimensions and the two intentions. However, the relationships were fully mediated when perceived individual benefits and user satisfaction were added to the model, as path coefficients in the mediated model become insignificant (Baron and Kenny, 1986). Hence, perceived individual benefits and user satisfaction fully mediated the impacts of information and system quality on the two continuance intentions. In the same vein, the results of the mediating effect 2 show that user satisfaction partially mediates the relationship between perceived individual benefits and the two continuance intentions.

<b>TABLE 12. Path Coefficients of Mediating Effects of Study 1</b>				
<b>Mediating Effect 1</b>				
	<b>Non-mediated model</b>		<b>Mediated model (perceived individual and user satisfaction as mediators)</b>	
	Continuance Intention to Consume	Continuance Intention to Provide	Continuance Intention to Consume	Continuance Intention to Provide
<b>Perceived Information Quality</b>	0.409***	0.305***	0.047	-0.028
<b>Perceived System Quality</b>	0.248***	0.198**	-0.023	-0.045
<b>Mediating Effect 2</b>				
	<b>Non-mediated model</b>		<b>Mediated model (user</b>	

	<b>satisfaction as the mediator)</b>			
	Continuance Intention to Consume	Continuance Intention to Provide	Continuance Intention to Consume	Continuance Intention to Provide
<b>Perceived Individual Benefits</b>	0.739***	0.642***	0.449***	0.448***

#### 2.6.4 Common Method Variance

Common method variance (CMV) refers to “variance that is attributable to the measurement method rather than to the construct of interest” (Podsakoff et al. 2003: pp. 879). In our context, common method variance may exist due to the single survey method used to collect responses. We addressed its potential threat by following Podsakoff et al.’s (2003) guidelines.

At the design stage of the study, we invited four VC managers to review the survey and revised the items based on their comments. The purpose was to reduce common method variance as a result of item characteristics (e.g., item complexity, ambiguity). Second, the survey items were presented in a random order, so that items making up a construct were not placed next to each other. This may reduce the method effects by item context. Third, at the reporting stage, we told respondents that the survey was completely anonymous and no individual data would be disclosed at any time. Doing so may alleviate the method effects by common rater. We also incorporated several reverse-coded items to further reduce common method bias (Lindell and Whitney 2001).

At the data analysis stage of the study, we applied three statistical techniques to control common method variance. First, we ran the *Harman’s one-factor test* and the results indicated that there were more than one factor that accounted for the majority of covariance. Second, we adopted *partial correlation procedures* to include a general factor and link it to all the constructs in the model. The general factor was identified from

the first unrotated factor (Podsakoff et al. 2003). It was composed of the four items of *Navigation* construct with the highest loadings close to 0.7 among all the items. After adding the general factor into the model, it is found that the structural model was not affected greatly (Table 13). In addition, all the  $R^2$  were only slightly increased, implying that common method variance only accounted for a small portion of the variance. The increase level (1.7% at highest) of our results is much lower than the level suggested by Williams et al. (1989) (16%-42%). Finally, we followed the procedures of the *marker-variable technique* to assess common method variance (Malhotra et al. 2006). We selected the two smallest correlations in the correlation matrix as the two marker variables. After plugging in the second smallest correlation as the marker variable (a more conservative estimate), only 1 out of 147 correlations became insignificant. Furthermore, all 147 correlations remained significant in the case of the smallest correlation as the marker variable. The low percentage ( $1/147=0.68\%$ ) of the significance change when adjusted for CMV shows that common method variance is not a big concern in the model.

**TABLE 13. Partial Correlation Procedures: A Comparison Between Original and CMV-adjusted Structural Models of Study 1**

Hypothesis	Path		Coefficient (CMV- adjusted)	T Value (CMV- adjusted)	R <sup>2</sup> (CMV- adjusted)	Supported (CMV- adjusted)
	From	To				
H1a	Perceived Individual Benefits	Continuance Intention to Consume	0.417*** (0.422***)	6.332 (6.707)	61.0% (61.2%)	Yes (Yes)
H2a	User Satisfaction		0.390*** (0.417***)	6.296 (6.891)		Yes (Yes)
H1b	Perceived Individual Benefits	Continuance Intention to Provide	0.196** (0.202***)	2.063 (2.200)	41.7% (41.8%)	Yes (Yes)
H2b	User Satisfaction		0.420 (0.428***)	4.202 (4.314)		Yes (Yes)



H3	Perceived Individual Benefits	User Satisfaction	0.464*** (0.455***)	8.953 (9.215)	69.6% (69.7%)	Yes (Yes)
H5a	Perceived Information Quality		0.285*** (0.282***)	4.657 (4.945)		Yes (Yes)
H5b	Perceived System Quality		0.261*** (0.291***)	4.151 (2.668)		Yes (Yes)
H4a	Perceived Information Quality	Perceived Individual Benefits	0.454*** (0.428***)	6.596 (5.665)	44.5% (46.2%)	Yes (Yes)
H4b	Perceived System Quality		0.285*** (0.585***)	3.626 (4.531)		Yes (Yes)

### 2.6.5 Control Variables

For the control variables (Figure 2), continuance intention to consume is positively affected by how long a user has been a member of the VC. Interestingly, continuance intention to provide is negatively related to age, gender and level of education but positively related to average hours spent in VCs per week. All other control variables have no statistically significant impacts on users' future participation.

### 2.7 Discussion

This study proposes a model to understand VC user retention from a quality perspective. We offer several insights in understanding IS post-adoption in terms of system management and design in the VC context.

#### 2.7.1 Users' Continuance Intention to Participate in VCs for Information Exchange

Unlike traditional IS, users' intention to participate in a VC should be captured by both passive information consumption and active information provision. Consistent with IS post-adoption research, this study finds that both continuance intention to consume and continuance intention to provide is directly determined by perceived individual

benefits and user satisfaction. When a user believes that he or she will benefit from participating in the community, his retention intention will be enhanced. When a user is satisfied with his past experiences using the community, he or she is more likely to continue using it. Furthermore, those two factors fully mediate the impacts of information and system quality on VC users' continuance intention. It indicates that information and system quality are the fundamental factors in retaining VC users.

By integrating the IS post-adoption and IS Success model, this study confirms and extends the study of IS continuance from a quality perspective. It could be argued that the functional robustness (information and system quality) of the system needs to be taken into account in post-adoption research. The model advances our understandings of the role of IT in IS continuance usage.

#### 2.7.2 Understanding VCs from the Quality Perspective

The research findings indicate that a VC with high-quality user-generated contents enables users to access superior resources, facilitates information communication and improves the effectiveness of interaction. Consequently, users will benefit from the high-quality contents by minimizing information processing efforts and maximizing information value (Jones et al. 2004). Users can capitalize on and appreciate user-generated contents only when they are perceived as truthful, relevant, helpful and from credible sources (Zhang and Watts 2008). By actively providing high-quality contents, users are also able to help a larger number of audiences to fulfill their information needs.

System quality matters in terms of how the system can be effectively designed and managed to enhance and support user experiences with the VC. For example,

effective navigation tools and aesthetic design are necessary to reduce information processing cost and increase communication effectiveness (Jones et al. 2004). A VC should also provide user-friendly features that allow users to post their comments easily. Ease of information provision encourages users' willingness to contribute and help others, resulting in more benefits to both information consumers (e.g., information benefits) and providers (e.g., visibility benefits). System features, such as user profiling, user visibility of status and past contributions, allow users to know more about each other and encourage further personal interaction and knowledge contribution (Gu et al. 2007). Thus, high-quality system features can be leveraged as a tool for maximizing information value to users. In return, users will be satisfied with the VC and become more committed to the community in the future (Vatanasombut et al. 2008).

Our model suggests that information quality and system quality are the two complementary quality dimensions in determining users' continuance intention to participate. Based on the results, information quality is weighted as slightly more influential than system quality. Although this finding is consistent with Agarwal and Venkatesh's (2002) work, suggesting that information capability of a website is the most important category for users to assess, we need to take both factors into account when evaluating the usefulness of a VC and user satisfaction toward it.

### 2.7.3 Concerns of Information Quality in VCs

To empirically investigate what quality issues users are concerned about, we model both information and system quality as second-order constructs formed by multiple first-order constructs. The results confirm that quality dimensions suggested by

prior IS studies are still valid in the VC context (Lee et al. 2002; McKinney et al. 2002; Nelson et al. 2005). However, the importance of these dimensions varies.

For information quality, our results are similar with McKinney et al.'s (2002) study on customer satisfaction with B2C websites. Information reliability, format, and relevancy are the three most important dimensions.

Information *reliability* becomes the primary concern to users because information comes from strangers whom would be difficult for users to trust and rely on. For example, in a travel-related VC like Site A, users would like to see comments from real travelers, instead of a person who posts comments simply for commercial purposes. One respondent mentioned that information will be more reliable and trustworthy when the VC eliminates commercials. In contrast, when employees use an IS at work, information reliability can be greatly guaranteed because information entered into the system is typically processed and managed *ex ante*. This dimension reflects the special features of VCs.

*Format* of information is the second most important dimension. With a huge amount of information available online, information should be formatted in a way that is easy to read, so that users can quickly understand and process information for their own purposes.

It is also interesting to find that *objectivity* is the least important dimension. This could be attributed to the fact that users are free to express their own opinions based on personal experiences in a VC. It is understandable that their comments are subjective to their own judgments and experiences. As a result, users care less about objectivity of the comments. However, information from organizational IS and E-commerce websites is

more factual and data-oriented, rather than personal experiences. This dimension reflects the special features of VCs.

#### 2.7.4 Concerns of System Quality in VCs

In terms of system quality, *navigation* is rated as the most important dimension. This result provides empirical support for Jones et al.'s (2004) study. In order to alleviate the negative effects of information overload, effective navigation tools are necessary to decrease users' information processing cost and help them easily identify information. The results confirm prior research on system navigation as a critical indicator of website success (McKinney et al. 2002).

*Security* is the second most important dimension of system quality. It highlights that privacy is one of the major concerns in VCs. In VCs where individuals do not know each other and do not have face-to-face communication, online trust is difficult to develop (Blanchard 2007). Thus, it is crucial for a VC to protect individual users' personal information from unauthorized access. Doing so will make users feel safe and comfortable interacting with others, further encouraging more user involvement in the VC (Yang et al. 2005). Relatively speaking, in the organizational context, where only internal employees can use a particular system, security can be handled and guaranteed more easily than in VCs.

Interestingly, our analysis shows that *interactivity* is the least important dimension. It refers to the degree to which the system can facilitate direct user interaction in a VC. It includes interacting with other users by various methods, allowing users to access others' profile, their participation history, etc. On one hand, the results indicate that users would like to know each other (e.g., user profile, past contributions), as a better

understanding of users in the discussion group may facilitate the effectiveness of information sharing. By contrast, traditional IS users do not need to have direct online interaction with others as they simply obtain information from the system within the organization. So, interactivity is still a significant factor to evaluate the system. On the other hand, interactivity is the least important factor compared with other dimensions. This may imply that user social interaction is limited, as the primary purpose of social interaction in information-exchange VCs is to consume and provide information. In Site A, there are multiple ways for users to know each other, such as through the forum, personal email and blog. Users may simply use discussion forums to seek or exchange traveling information without further personal interactions by emails or blogs. Hence, it is reasonable to argue that interactivity will be less salient in our research context than in social networking VCs (e.g., Facebook and MySpace).

#### 2.7.5 Theoretical Contributions

This study adds to the current work with a particular focus on the quality of both user-generated contents and the system itself in VCs for information exchange. While the importance of quality in information-exchange VCs has been highlighted (Butler 2001; Gu et al. 2007), empirical investigations up to now have been limited. Among a number of studies that examine quality in online forums or message boards, they mainly focus on the quality of information contents, without taking system performance into consideration (Cheung 2008; Lin and Lee 2006; Zhang and Watts 2008; Park et al., 2010). This study theorizes that information quality and system quality are both critical to understand user decision-making on continued participation. Indeed, they serve as the primary sources of individual benefits of participation which directly motivate users to keep using the VC.

To the best of our knowledge, this is also one of the first IS studies that differentiate and investigate two types of user continuance intention in VCs for information exchange. Given the fact that users are not only information consumers but also information providers in VCs, both consuming and providing are socially desirable behaviors in VCs. Researchers have agreed that reasons for information consumers and information providers to participate could be different (Ridings et al. 2006; Park et al. 2010). So, separating information consuming from providing allows us to think in depth from different perspectives and provide better rationale for each behavioral intention.

This study contributes to the literature by integrating two research streams as the theoretical lens: IS post-adoption and IS Success research. Traditional IS post-adoption research has widely agreed that continuance intention is directly determined by affective characteristics of the system such as perceived usefulness and user satisfaction based on past usage experiences (Bhattacharjee 2001a, 2001b; Karahanna et al. 1999; Kim and Son 2009). However, as the focus of this study is to understand the impact of quality on continuance intention, the IS post-adoption research does not specifically discuss the role of quality. Hence, we refer to the IS Success model that pinpoints the primary role of quality and incorporate quality into the post-adoption usage in our model. Although the IS Success research looks at intention to use/use, it mostly focuses on initial adoption or actual usage in terms of frequency and depth of use. It does not explicitly explain user decision making on continued usage. In addition, as DeLone and McLean (2003) emphasized, the IS Success is a taxonomy based on a process model of IS. As a result, the IS Success model alone may not be sufficient to explain casual relationships for post-adoption.

In these regards, it is necessary to integrate the two streams to study post-adoption from a quality perspective. It provides us a better theoretical foundation for the model with a particular focus on quality. The integration highlights the functional characteristics of the VC (information and the system) as the fundamental factors in the post-adoption stage of system usage. Furthermore, modeling information quality and system quality as multi-dimensional constructs enables us to pay attentions to the specific quality concerns by users, instead of general impression about quality.

Last but not least, this study proposes and empirically incorporates four types of individual benefits in VCs to capture users' evaluation of the system performance of a VC: information, social, visibility and altruistic benefits. Traditional IS post-adoption studies used perceived usefulness, a construct from TAM, as a proxy to capture user evaluation of system performance (Davis et al. 1989; Bhattacharjee 2001a). In order to reflect VCs that exhibit characteristics beyond those of a traditional IS, this study extends perceived usefulness to perceived individual benefits, which encompasses the four different kinds of benefits that are specific to reflect the research context.

#### 2.7.6 Practical Implications

This study offers several practical implications for VC design and management. Based on the results, VCs need to manage the information contents and improve system performance to create individual benefits, leading to continued participation in the future.

First, VCs need to set up quality control mechanisms to ensure the quality of contents. A VC should frequently monitor, filter or remove posts that are from unreliable sources (e.g., commercial ads). The community could also ask users to rate the



helpfulness of individual posts and highlight a number of most helpful posts. It could help other users to better understand the topic and lead the discussion on track.

Second, the community could provide a predefined template for certain posts (e.g., pros and cons of a travel destination, with additional comments). By providing a more organized way to express opinions, the community makes users easier to read, write and follow the discussion. It may also motivate more users to contribute.

Third, the community needs to regularly track users' activities and keep touch with users outside of the community. For example, when users do not participate for a long period, the community may send an email telling users current or hot topics that are currently discussed in the community. It may give users a gentle reminder of the community activities and attract users back to the discussion.

Fourth, VCs also need to improve the system design to facilitate user participation. Effective navigation tools are necessary for users quickly locate information they want and join the discussion. A highlight of the hottest topics at the homepage will have an eye-catching effect to attract users to participate. VCs could also use IT artifacts to acknowledge user contributions and increase the visibility of active users to the community. Examples are giving users badges (e.g., top contributor, gold member) based on their contribution history and placing an announcement of active users to the whole community. In addition to encourage user participation via system design, the VC should carefully manage users' personal information not being disclosed or accessed without authority, providing a secure platform for strangers to interact.

### 2.7.7 Limitations and Future Research

As the use of intention for continued use is a well-established approach in the IS post-adoption research (Bhattacharjee 2001a), we use continuance intention as a proxy to examine continued use of VCs. In addition, considering that the survey was anonymous and we did not have access to respondents' contact information, it was not feasible to contact them again and track their actual use behaviors. One potential research could examine actual continued use behavior as the dependent variable in a longitudinal study.

Since the research scope is limited to VCs for information exchange, the research findings may not be generalized to other types of VCs, such as social networking sites (e.g., Facebook). Future research could examine how the proposed research model can be applied and extended to different types of VCs (as those in the topology we proposed in Table 2) in order to validate our results in a broader context. It should be noted that in VCs for information exchange, information quality is a critical factor that determines the success of the VC. However, in VCs for social networking, the top concerns may be different (e.g., social interaction among users). As a result, it is reasonable to expect that the importance of information and system quality may vary across different research contexts. We should be cautious when applying the model into other contexts.

To validate the model, we collected responses from a large traveling community. Since we surveyed only one VC, the sample may not be representative. Hence, future research could invite more VCs covering a broader range of topics to participate and increase the representativeness of the sample.

The last limitation is related to construct development and validation. As discussed above, this study contribute to the IS field by extending *perceived usefulness* to

*perceived individual benefits*, in order to enrich our understanding of system performance in the VC context. However, as one of the first IS studies that examine this construct, we call for more efforts to refine and validate it theoretically and methodologically. Similarly, due to the lack of available scales, we developed new scales for *interactivity* to capture direct user interaction supported by VCs. It is necessary to further refine this system quality dimension in the future VC research.

## 2.8 Concluding Remarks

To conclude, this study confirms the theoretical underpinnings of both IS post-adoption research and the IS Success Model. With all the hypotheses supported, the model suggests that information and system quality are the two fundamental determinants of users' continuance intention to participate in VCs. In particular, user satisfaction and perceptions about individual benefits fully mediate the relationship between the two quality aspects and continuance intention. We hope this study can open up more research ideas on quality control of user-generated contents, system design and individual benefits in VCs.

CHAPTER 3: PREDICTING USERS' CONTINUANCE INTENTION IN VIRTUAL  
COMMUNITIES: THE ROLE OF PAST BEHAVIOR  
-- A MODEL EXTENSION OF STUDY 1

### 3.1 Introduction

With the rapid growth of virtual communities (VCs), more and more people access, create, and exchange information online with millions of others worldwide. For example, TripAdvisor, the largest travel community in the world, has attracted more than 40 million unique monthly visitors, 20 million members, and over 50 million reviews and opinions<sup>5</sup>. As an increasingly popular social phenomenon, VC's development depends largely on users' voluntary participation since users create the majority of the contents and initiate virtual social interaction. As a result, it is critical for a VC to attract users and encourage their continuous participation.

Users decide how to participate in a VC on their own, and they exhibit different participation behaviors. For example, some users may be more active and spend more time than others. Voluntary participation and diversity of user behavior raise an interesting research question: *can we use users' past behavior to predict their future participation intention in a VC?*

Based on the marketing research on consumer behavior (Thompson and Troester 2002), we categorize VC users by two types of past behavior. One is *tenure* (membership since joining a VC) that differentiates novice users from experienced users. The other is

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<sup>5</sup> [http://www.tripadvisor.com/pages/about\\_us.html](http://www.tripadvisor.com/pages/about_us.html), retrieved on September 28, 2011

*extent of usage* (time spent in a VC per week) that differentiates light users from heavy users. Prior studies suggest that past behavior may predict future behavior (Bergeron et al. 1995; Ouellette and Wood 1998). Since VC users are not only information consumers but also providers, we examine two types of intentions: *continuance intention to consume* and *continuance intention to provide*. Both types of participation behaviors are socially desirable and essential to the development of a VC (Ridings et al. 2006).

Prior research on the impact of past behavior on users' continuance intention in VC is limited. Although a couple of papers examined past behavior in VCs, they either focused on the motivations for past behavior (Ridings et al. 2006), or simply treated past behavior (e.g., tenure) as a control variable (Ma and Agarwal 2007). Few studies examined the explicit role of past behavior in driving future participation. Past behavior has been extensively studied in social psychology (e.g., Theory of Planned Behavior), suggesting its direct as well as moderating effects on future behavioral intention (Bagozzi 1981). IS literature has also revealed that past behavior affects future IS use (Bergeron et al. 1995). However, given the special features of VCs, such as user-generated contents and voluntary participation, results in VCs might not be consistent with the existing findings in the traditional context. In particular, we differentiate two types of participation intentions (continuance intention to consume and to provide) in VCs and examine how past behavior impacts them differently.

Furthermore, this is one of the first IS studies that considers past behavior from multiple perspectives (i.e., tenure and extent of usage). Our results imply that it is necessary to differentiate tenure and extent of usage since they motivate users' continuance intention differently. We found that tenure plays a significant role in

continuance intention to consume, while extent of usage impacts continuance intention to provide. Last but not least, this paper examines both the direct and moderating effects of past behavior on future behavior. Based on these results, we offer both theoretical and managerial implications to VC researchers and practitioners.

It is worthwhile to note that we focus on past behavior, NOT on habit. Habit refers to “*the extent to which people tend to perform behaviors (use IS) automatically because of learning*” (Limayem et al. 2007, pp. 709). According to the literature, past behavior and habit are two different concepts, as past behavior helps to form the habit and reflects habit strength (Ouellette and Wood 1998; Limayem et al. 2007). Furthermore, habit is measured based on users’ perceptions about IS use. In contrast, past behavior examined in our study can be objectively traced by VC managers. Thus, our results may help VC managers to design effective incentive mechanisms to retain various types of existing users.

The remainder of this paper is organized as follows. In Section 2, we present the theoretical background. The research model and hypotheses are proposed in Section 3. Section 4 discusses methodology and data collection, followed by data analysis in Section 5. Research findings, theoretical and managerial implications, limitations and future research are presented in Section 6.

### 3.2 Theoretical Background

Past behavior has been studied from multiple perspectives such as how long a behavior has been performed so far (Bergeron et al. 1995), as well as the frequency of / how often a past behavior is performed (Bagozzi 1981; Beck and Ajzen 1991; Saba et al.

2000). Thus, we consider both *tenure* and *extent of usage* as past behavior in our research.

### 3.2.1 Direct Effects of Past Behavior

In social psychology, a number of studies have focused on the role of past behavior in future intention and behavior. They looked at the predictive power of past behavior in the context of the Theory of Planned Behavior. Ouellette and Wood (1998) argued that there are two processes through which past behavior guides future behavior. The first process is that past behavior has a direct effect on future performance. An individual performs a behavior simply because he or she has performed the behavior before. In this process, well-practiced behaviors will be repeated in a stable or constant context, as long as all internal or external factors remain unchanged (Beck and Ajzen 1991). Consistently, Ajzen's (1991) summarized that past behavior has an impact on future behavior independent of the effects of beliefs, attitudes, and subjective norms. Bagozzi (1981) found that past behavior influences future behavior through its impact on intentions.

### 3.2.2 Moderating Effects of Past Behavior

In the second process, conscious decision making is likely to initiate the behavior when it is not well learned or is performed in an unstable context. In this case, past behavior may contribute to future behavior through its moderating effects.

From a social psychological perspective, when people are consciously deliberating about acts, they tend to evaluate the outcomes of the behavior (e.g., attitudes) in a careful and thoughtful manner before they form intentions (Ouellette and Wood 1998). In the IS field, it is generally agreed that at its basis, continuing IS use is driven by

a conscious or rational decision making process (e.g., beliefs, expectations and reflections on past experience) (Kim and Malhotra 2005; Ortiz de Guinea and Markus 2009). The main focus of IS post-adoption research is cognition-oriented (e.g., perception and reasoning) behavioral models (e.g., TAM, IS Continuance Model) (Jasperson et al. 2005; Kim et al. 2005). Based on the Theory of Reasoned Action (Fishbein and Ajzen 1975), Karahanna et al. (1999) found that behavioral beliefs about using an IS (*perceived usefulness*) determine continuance intention. Consistently, Bhattacharjee (2001) developed an IS continuance model that theorizes evaluations of system usage based on past experiences (*perceived usefulness*) as a primary factor in driving continuance intention.

*Perceived usefulness* refers to a user's ex-post expectations about system effectiveness and the net benefits of system use based on past experiences (Bhattacharjee 2001). In our research, perceived usefulness means user perceptions about system effectiveness in facilitating achievement of various individual benefits when participating in a VC. Based on prior VC research (Blanchard and Markus 2004; Ridings et al. 2006; Wasko and Faraj 2000, 2005), we extend the generic perceived usefulness construct into four types of benefits VC users may obtain via community activities: *perceived information benefits*, *perceived social benefits*, *perceived visibility benefits*, and *perceived altruistic benefits*.

As a VC provides a social platform for people to exchange information, Social Exchange Theory (SET) (Blau 1964) provides a theoretical basis for explaining user participation intention from a sociological perspective. Generally speaking, SET posits that social exchange will be limited to actions that are contingent on rewarding reactions



from others. In social exchanges, people do others a favor with a general expectation of future rewards (Kankanhalli et al. 2005). Social exchange in VCs is a generalized exchange, in that the exchange is not necessarily with the same member a user helped, but with any community members (Ridings et al. 2006). In addition, social exchange is expected to be reciprocal in the sense that users are not only information consumers but also providers.

Although the conscious decision-making process plays a fundamental role, past behavior may contribute to predicting future intention in an unconscious way. That is, people may base intentions on more easily determined cues such as past behavior (Ouellette and Wood 1998). Bagozzi (1981) found that the inclusion of past behavior will attenuate the impact of attitudes on intentions. Recently, an increasing number of IS researchers have focused on continuing IT use without conscious intention. Limayem et al. (2007) indicated that future behavior tends to be performed with almost no cognitive effort, as the individual gains adequate practice in the past and his familiarity with the behavior increases. Kim et al. (2005) also concluded that with repeated IS use in the past, the overall role of rational evaluation will diminish in importance as a determinant of behavioral intention.

### 3.3 Hypotheses Development

#### 3.3.1 Direct Effects of Past Behavior

In the marketing literature, consumption and production of an association's products or services are identified as two primary membership behaviors (Gruen et al. 2000). To satisfy members' needs and maximize their membership benefits, it is necessary to not only encourage them to consume but also involve members in producing

products or services. In the organizational science literature, Ahuja and Galvin (2003) found that information seeking and providing are the two effective ways employees use to socialize with others in a virtual group (e.g., Email). Similarly, we consider two continuance intentions: continuance intention to consume and to provide. *Continuance intention to consume* represents the extent to which a user intends to continue browsing or seeking information in a VC. *Continuance intention to provide* refers to the extent to which a user intends to continue contributing his knowledge to a VC.

According to the literature on direct effects of past behavior discussed above, we argue that as a user has been using a VC for a while, he or she becomes familiar with the system and tends to keep using it to fulfill his future needs. In addition, when a user has been a member for a while, his sense of community may be increasing (Blanchard and Markus 2004). Strong sense of community would make a user feel greater sense of belonging and emotional connection with the community, thus motivating him to contribute information back to the community.

**H1a,b:** *Tenure will be positively associated with a user's continuance intention to consume and continuance intention to provide in a VC respectively.*

In the same vein, when a user has been heavily involved in VC-related activities, his sense of belonging to the community may be increasing (Blanchard and Markus 2004). Thus, we expect that the user's intention to continue consuming or providing will be stronger. Hence, we hypothesize:

**H2a,b:** *The extent of usage will be positively associated with a user's continuance intention to consume and continuance intention to provide in a VC respectively.*

### 3.3.2 Moderating Effects of Past Behavior

In addition to the direct effects of past behavior, literature on TPB and IS post-adoption research has agreed that past behavior also plays a moderating role in future behavior. Intention of future behavior involves conscious and unconscious decision making (Ouellette and Wood 1998). In the conscious decision making, an individual tends to evaluate the outcomes of the behavior (e.g., attitudes) rationally. In a VC, a user may perform a cost-benefit analysis before consuming or providing information (Ridings et al. 2006). When benefits outweigh costs of participating, the user may keep involving himself in the community. In this sense, a VC user needs to carefully evaluate his perceived individual benefits before continuing his participation.

As participation in VCs is open and voluntary, there is no control over users as to how they should participate (Wasko and Faraj 2005). As a result, social exchange in VCs depends totally on users' own motivation. According to Homans (1974), the more benefits a user gets from participating in a VC, the more likely he or she is to stay in the same VC. The value of a VC depends on its ability to transfer resources to individual users' benefits (Butler 2001). Thus, individual benefits of participating in VCs can serve as motivators of social exchange in VCs.

Based on the summary of Butler et al. (2002), we identify four types of individual benefits as follows. *Information benefits* are achieved when users can access expertise and obtain useful information (Constant et al. 1996; Wasko and Faraj 2000). *Social benefits* are emotional and camaraderie support from other VC users achieved through information exchange and social interaction (Butler et al. 2002; Wasko and Faraj 2000; Konana and Balasubramanian 2005). *Visibility benefits* are related to a user's personal

image and reputation based on his involvement in a VC. When personal image or reputation is enhanced, visibility benefits are achieved (Wasko and Faraj 2005). To increase visibility benefits, users need to make valuable contributions to others. *Altruistic benefits* are an individual's psychological happiness when helping others (Constant et al. 1996). Users may enjoy the helping process and promoting online discussion.

As most of the contents in VCs are user-generated, users can maximize their information benefits when they can access superior resources and get advice from others. If a user values information benefits obtained from a VC, he or she is more likely to continue consuming information in order to keep getting such benefits. Given the competition among VCs, if a user cannot benefit from information, he or she may simply switch to another VC that can satisfy his information needs (Jones et al. 2004). On the other hand, given that social exchange in VCs is generalized and reciprocal, valuable information may also encourage users to contribute their own knowledge to others in return. Hence, we hypothesize:

**H3a:** *Information benefits are positively related to users' continuance intention to consume.*

**H3b:** *Information benefits are positively related to users' continuance intention to provide.*

In VCs, geographically-dispersed friends or strangers develop virtual social relationships through user interaction (Butler et al. 2002). For information consumers, social benefits are achieved when others are willing to share their opinions or stories with them, thereby providing strong emotional and spiritual support. Users who receive social benefits in this way may feel that there is a group of people who care about them. For

information providers, social benefits are achieved when others actively respond to them by supporting or triggering more discussions. Users who receive social benefits through this way may feel that there is a group of people that are willing to respond to and interact with them. Regardless of how social benefits are obtained, when users believe that they will get others' emotional support and response, they are more likely to stay in the same VC and keep in touch with others. In these regards, we hypothesize:

**H4a:** *Social benefits are positively related to users' continuance intention to consume.*

**H4b:** *Social benefits are positively related to users' continuance intention to provide.*

Visibility benefits occur when users establish reputation by providing information and resources (Butler et al. 2002). According to social exchange theory, in order to provide information, users must think that their contribution will be worthwhile and valuable not only to others but also to themselves (Wasko and Faraj 2005). By providing information, social rewards such as reputation and respect are expected which motivate users to actively participate in content generation. Therefore, many VCs implement effective IT artifacts to acknowledge those who contribute and make them visible to others (Ma and Agarwal 2007). Doing so will increase personal image and reputation, and thus, encourage users' continuous engagement. To maintain their reputation, users may also need to know what others have contributed and learn from others' opinions. Doing so will help them to provide more valuable and relevant information to others. Hence, we hypothesize:

**H5a:** *Visibility benefits are positively related to users' continuance intention to consume.*

**H5b:** *Visibility benefits are positively related to users' continuance intention to provide.*

Altruistic benefits are intrinsic enjoyment from helping others (Kankanhalli et al. 2005). In contrast to information, social and visibility benefits that are external rewards from participating in VCs, altruistic benefits are internal rewards from the sake of the activity itself (Wasko and Faraj 2005). Prior research has indicated that altruistic benefits motivate users to offer help because they value the opportunity to benefit others (Butler et al. 2002; Wasko and Faraj 2000). On the other hand, as social exchange is reciprocal, a user may also expect valuable information from others at the same time he or she offers help to them. When users cannot get anything back from others, they will be discouraged to continue offering help. Thus, we hypothesize:

**H6a:** *Altruistic benefits are positively related to users' continuance intention to consume.*

**H6b:** *Altruistic benefits are positively related to users' continuance intention to provide.*

Ortiz de Guinea and Markus (2009) pointed out that rational evaluations will be diminished when users are becoming more and more experienced with the system usage. According to the IS post-adoption research, "*as individuals gain experience with what was initially a novel behavior, they tend to engage less frequently in reflective consideration of this behavior and rely instead on previous patterns of behavior to direct future behaviors*" (Jasperson et al 2005: pp. 542). It implies that past behavior will

weaken the conscious decision making, decreasing the impact of rational evaluations on continuous behavioral intention. In this regard, we hypothesize:

**H7a,b,c,d:** *Tenure weakens the relationship between the four types of individual benefits and continuance intention to consume respectively.*

**H8a,b,c,d:** *Tenure weakens the relationship between the four types of individual benefits and continuance intention to provide respectively.*

**H9a,b,c,d:** *Extent of usage weakens the relationship between the four types of individual benefits and continuance intention to consume respectively.*

**H10a,b,c,d:** *Extent of usage weakens the relationship between the four types of individual benefits and continuance intention to provide respectively.*

### 3.4 Research Methodology

#### 3.4.1 Data Collection

As an extension of Study 1, the same dataset was used to run the model. The total usable sample size was 281.

#### 3.4.2 Instrument Development

Whenever possible, measurement items were adopted from prior research and measured using a 5-point Likert scale (1-strongly disagree, 5-strongly agree). The items for four types of perceived individual benefits were newly developed based on prior research on user motivation for participating in VCs (Butler et al. 2002; Wasko and Faraj 2005). To ensure face validity, we conducted an extensive literature review and consulted with senior researchers and community managers. The items for continuance intention to consume and continuance intention to provide are developed based on IS post-adoption research (Bhattacharjee 2001). We used a single item to measure tenure and extent of

usage to capture users' past behavior. All of the constructs are reflective. Gender, age and education were included as control variables.

### 3.5 Data Analysis and Results

As the dataset violated multi-normality and the model is exploratory in nature, we used PLS-based structural equation modeling (SEM) (SmartPLS 2.0, developed by Ringle et al. 2005) to validate the model. Past behavior was captured by either tenure or extent of usage, and we ran two separate models to explicitly examine their direct as well as moderating effects.

#### 3.5.1 The Measurement Model

We first checked the measurement model based on the confirmatory factor analysis in SmartPLS 2.0. We assessed construct reliability, convergent validity and discriminant validity. Reliability is evaluated by computing AVE (Average Variance Extracted), CR (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 14 indicates that all the constructs are reliable. Although perceived social benefits and perceived visibility benefits have Cronbach's Alpha lower than 0.7, their AVEs and CRs are well above the cut-off values. Thus, they could be considered as reliable.

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 14 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 15 indicates that all the constructs are distinct. In addition,



we checked item cross-loadings based on the SmartPLS results. Each item loads higher on its designated construct than other constructs and the cross-loading differences are higher than the suggested threshold of 0.10 (Gefen and Straub 2005). As a result, no severe cross-loading problems are found in the measurement model.

**TABLE 14. Convergent Validity of Study 2**

Construct	AVE	Composite Reliability	Cronbach's Alpha	Items	Parameter Estimate	T value
Perceived Information Benefits	0.66	0.85	0.74	IB1	0.84***	31.59
				IB2	0.80***	25.87
				IB3	0.79***	24.31
Perceived Social Benefits	0.61	0.82	0.67	SB1	0.84***	34.32
				SB2	0.81***	23.54
				SB3	0.67***	13.37
Perceived Visibility Benefits	0.66	0.79	0.50	VB1	0.90***	34.33
				VB2	0.72***	11.55
Perceived Altruistic Benefits	0.73	0.89	0.81	AB1	0.85***	37.39
				AB2	0.87***	44.21
				AB3	0.85***	28.07
Continuance Intention to Consume	0.84	0.94	0.91	CIC1	0.93***	63.43
				CIC2	0.95***	84.89
				CIC3	0.87***	42.28
Continuance Intention to Provide	0.83	0.94	0.90	CIP1	0.91***	57.92
				CIP2	0.90***	57.36
				CIP3	0.94***	74.10
Tenure <sup>6</sup>	1.00	1.00	1.00	T	1.00	N.A.
Extent of Usage	1.00	1.00	1.00	EU	1.00	N.A.

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

**TABLE 15. Discriminant Validity of Study 2**

	Mean	S.D.	AVE	IB	SB	VB	AB	CIC	CIP	T	EU
Perceived Information Benefits	4.07	0.64	0.66	<b>0.81<sup>7</sup></b>							
Perceived Social Benefits	3.91	0.64	0.61	0.71	0.78						
Perceived Visibility Benefits	2.74	0.85	0.65	0.46	0.58	0.81					
Perceived Altruistic	4.20	0.58	0.73	0.46	0.60	0.58	0.85				

<sup>6</sup> Tenure and extent of usage are single-item constructs.

<sup>7</sup> The squared root of AVE of each construct is shown in bold on the main diagonal.

<b>Benefits</b>											
<b>Continuance Intention to Consume</b>	4.41	0.67	0.84	0.74	0.64	0.43	0.50	0.92			
<b>Continuance Intention to Provide</b>	4.06	0.84	0.83	0.54	0.51	0.51	0.56	0.69	0.91		
<b>Tenure</b>	4.43	1.09	1.00	0.02	0.00	-0.01	0.11	0.11	0.13	1.00	
<b>Extent of Usage</b>	1.70	0.90	1.00	0.00	0.18	0.15	0.24	0.12	0.23	0.15	1.00

### 3.5.2 The Structural Model

We used SmartPLS 2.0 to test the structural model and hypotheses. A bootstrapping procedure with 500 iterations was performed to examine the statistical significance of the path coefficients and  $R^2$  of the overall model (Chin 1998).

The results of the structural model are shown in Table 16. In the first model where past behavior is measured as tenure, our model explains 61.2% of the variance in continuance intention to consume and 48.3% of the variance in continuance intention to provide. In the second model where past behavior is reflected by extent of usage, the model explains 60.1% of the variances in continuance intention to consume and 50.5% of the variances in continuance intention to provide.

In terms of direct impacts of tenure and extent of usage, we found that tenure is only positively related to continuance intention to consume while extent of usage is only positively related to continuance intention to provide. As a result, H1a and H2b are supported and H1b and H2a are not supported.

Table 16 indicates that perceived information benefits (H3a), perceived social benefits (H4a) and perceived altruistic benefits (H6a) positively impact continuance intention to consume. Perceived information benefits (H3b), perceived visibility benefits (H5b) and perceived altruistic benefits (H6b) positively impact continuance intention to

provide. As far as the moderating effects of tenure and extent of usage are concerned, the results show that tenure plays a moderating role in continuance intention to consume. That is, as expected with H7b, it weakens the relationship between perceived social benefits and continuance intention to consume. In contrast, extent of usage plays a moderating role only in continuance intention to provide. That is, as hypothesized in H8d, it weakens the relationship between perceived altruistic benefits and continuance intention to provide (H8d).

For control variables, education is the only one that is found to be negatively related to continuance intention to provide. Age and gender do not have impacts on either intention.

Since the data was collected via a single method (survey), we used Harman's one-factor test, partial correlation procedures (Podsakoff et al. 2003) and marker-variable technique (Malhotra et al. 2006) to check the potential threats of common method variance (CMV). Our analysis shows that CMV is not a big concern here.

**TABLE 16. The PLS Structural Results of Study 2**

		<b>Model 1</b>		<b>Model 2</b>		
		Effects of Tenure on		Effects of Extent of Usage on		
		Continuance Intention to Consume	Continuance Intention to Provide	Continuance Intention to Consume	Continuance Intention to Provide	
<b>R<sup>2</sup></b>		61.2%	48.3%	60.1%	50.5%	
Direct Effects of Individual Benefits		IB	0.549***	0.33***	0.563***	0.375***
		SB	0.154**	-0.008	0.133**	0.011
		VB	-0.001	0.141*	0.015	0.158*
		AB	0.141***	0.274***	0.135***	0.218***
Tenure	Direct Effects	Tenure	0.092**	0.030		
	Moderation Effects	IB*T	0.097	0.055		
		SB*T	-0.156**	0.025		
		VB*T	0.050	0.088		

		AB*T	0.021	-0.053		
Extent of Usage	Direct Effects	Extent of Usage			0.041	0.150***
	Moderation Effects	IB*EU			-0.007	0.057
		SB*EU			-0.005	0.094
		VB*EU			-0.036	0.056
		AB*EU			0.036	-0.242***
Control Variables	Tenure				0.1**	0.041
	Extent of Usage	0.044	0.134***			
	Age	0.008	-0.040	0.006		-0.046
	Gender	0.028	-0.046	0.028		-0.052
	Education	-0.037	-0.097**	-0.032		-0.074*
IB: Perceived Information Benefits    SB: Perceived Social Benefits    VB: Perceived Visibility Benefits    AB: Perceived Altruistic Benefits    T: Tenure    EU: Extent of Usage						

\*\*\* Significant at the 1% level of significance    \*\* Significant at the 5% level of significance

\* Significant at the 10% level of significance

We followed the same steps in Study 1 to check model validity. In Model 1, continuance intention to consume ( $R^2=0.612$ ) and continuance intention to provide ( $R^2=0.483$ ) are described as moderate (Chin 1998). In Model 2, continuance intention to consume ( $R^2=0.601$ ) and continuance intention to provide ( $R^2=0.505$ ) are described as moderate as well. In addition, the model has approximately large effect size for all the dependent variables based on the  $f^2$  values (Henseler et al. 2009).

### 3.6 Discussion

#### 3.6.1 Direct Effects of Past Behavior

The results suggest that different types of past behavior play different roles in driving users' continuous participation in VCs for information exchange. Tenure, as measured by time it has been since joining in a VC, impacts users' continuance intention to consume information. The longer a user has joined the VC, the more likely he or she is to continue seeking information in the same VC for his own needs. As a user stays in a

VC for a while, he or she is gaining more experiences with the operation of the VC (e.g., topics, user interface, etc). Thus, the user might be used to using the VC for information seeking for a particular topic. The consumption behavior would become spontaneous for experienced users based on their past participation experiences. In contrast, the consumption behavior would be relatively intentional for new users as they need to figure out which VC to go to based on a rational decision-making process. On the other hand, consistent with Ma and Agarwal's paper (2007), tenure does not motivate users to continue contributing to the VC. It could imply that the providing behavior is self-motivated. Regardless of how long it has been since joined the VC, experienced users may not feel stronger obligation to contribute than novice users.

Extent of usage, as measured by hours spent in a VC per week, is shown to positively impact users' continuance intention to provide information, but not the intention to consume information. When a user spends a lot time in a VC, he or she could be considered as a heavy user. Active participation in a topic discussion, such as writing follow-up posts, requires time. As a heavy user is more likely to involve himself in VC activities other than just information seeking, he or she is more likely to become a key information contributor than a light user. Such a trend is likely to be carried on in the future.

### 3.6.2 Four Types of Individual Benefits

Based on Table 4, perceived information benefits, perceived social benefits and perceived altruistic benefits are found to be positively associated with the continuance intention to consume. When a VC can provide useful information to users that satisfy their information needs, they tend to stay in the VC to continue consuming information.

According to Gu et al. (2007), superior information could be used as a strategy to lock in existing users. When users get emotional and social support from other users, they are more likely to continue using the VC, as they expect more such benefits in the future. In addition, users who enjoy helping others would also expect to get something back from the VC. If a user keeps offering help without something back as a return, he or she may feel discouraged to continue joining the VC. Perceived visibility benefits have no impacts on continuance intention to consume, maybe because visibility benefits typically occur to information provision behavior, not consumption behavior.

Perceived information benefits, perceived visibility benefits and perceived altruistic benefits are found to be positively associated with the continuance intention to provide. As social exchange is a reciprocal process, users are willing to offer help to others who might have helped them to achieve information benefits. As providing information may increase a personal image in the VC, visibility benefits motivate users to keep providing information to others. Altruistic benefits also encourage users to keep providing information valued by others, as they enjoy helping others and feel happy that they are helpful to others. Social benefits do not play a significant role in the continuance intention to provide. It implies that in VCs for information exchange such as Site A, social benefits are limited to information exchange without much personal social interaction involved, thus users who receive information are more likely to obtain social benefits than users who provide information. In this regard, social benefits come mainly from information seeking, not from information providing.

### 3.6.3 Moderating Effects of Past Behavior

Among the four types of individual benefits, tenure is shown to only moderate the relationship between perceived social benefits and continuance intention to consume. The longer a user has been in a VC, the lesser the impacts of social benefits on consuming information in the future. Experienced users may know exactly what they are looking for in the VC. Thus their participation could be more self-determined with limited impact from other users.

Tenure does not moderate the relationship between perceived information benefits and continuance intention to consume. This implies that regardless of how long a user has been in a VC, he or she expects that the community can keep providing valuable information. Compared to novice users, experienced users may have been familiar with the VC and know what information they can get from the community and where to find the information without much effort or random browsing. However, experienced users are still concerned about the value of information in the VC and rationally evaluate their information benefits for future information consumption. From the community perspective, community managers need to be aware that provision of information benefits is critical to lock-in users and strengthen their loyalty to the community. Without sufficient information benefits, a user will not continue using the community and may switch to another one no matter how long he or she has stayed.

Similarly, tenure does not moderate the relationship between perceived altruistic benefits and continuance intention to consume. This finding suggests that both novice users and experienced users expect receiving help from others as they are happy to help others. Even though a user has been in the VC for a long period, he or she cares about

how much help he or she can get from others as a return of his contribution to the community.

In contrast, extent of usage only moderates the relationship between perceived altruistic benefits and continuance intention to provide. As a user spends more time on the VC such as reading posts, and participating in discussion, he or she is more involved in the community. The user's helping behavior could be spontaneous without thinking too much about how he or she enjoys the process of helping others.

The extent of usage does not moderate the relationship between perceived information benefits and continuance intention to provide. As social exchange is a reciprocal process, users do need to believe that the VC can provide them valuable information to motivate them to continue contributing their knowledge in the future. Greater extent of usage in a VC will not undermine the motivational role of information benefits in information provision.

In addition, the impact of perceived visibility benefits is not weakened by extent of usage on continuance intention to provide. Enhancing users' personal image and reputation is an effective mechanism to encourage information provision. The community managers need to think about how to increase users' visibility and acknowledge their contribution by improving system design of IT-based artifacts. Even for heavy users who spend more time in VCs than light users, they still want their contribution being valued and appreciated by the community. When they believe that their contribution are worthy of the time and efforts spent, they are more likely to continue providing information.



### 3.6.4 Theoretical Contributions

This research is one of the first IS studies that examine both direct and moderating effects of past behavior on IS post-adoption in the context of VCs. Given that the majority of VC contents are user-generated and user participation is mostly voluntary, we recognize that users may behave differently when consuming vs. providing information. Moreover, we look at past behavior from multiple perspectives: tenure and extent of usage. The results show that tenure and extent of usage can be used to predict different user behaviors. Furthermore, existing IS research have mostly examined past behavior from a subjective perspective. That is, they use habit as a proxy for past behavior based on users' perceptions. In contrast, our research attempts to understand the phenomenon from a more objective perspective. We also contribute to IS post-adoption literature by extending the meaning of *perceived usefulness* to four types of perceived individual benefits. We empirically examine their impacts on continuance intention in VCs.

### 3.6.5 Managerial Implications

To examine the role of past behaviors, we categorize users into two groups: experienced vs. novice users in terms of tenure; heavy vs. light users in terms of extent of usage. As shown in the model, users behave differently based on their tenure and extent of usage. Understanding this will provide insights on effective mechanisms for market segmentation in VCs. VC managers need to think about how to retain different kinds of users and motivate their active participation. As novice users are less likely to continue seeking information than experienced users, the VC should ensure that it can provide enough benefits to satisfy their personal needs to lock in those newcomers. On the other hand, as heavy users tend to keep providing information in the future, the VC needs to

think about how to effectively motivate them to keep staying in the community. For example, the VC could improve system design to make information provision easy. The VC can also include time spent in the community as a factor in computing users' contribution score and increase their reputation. By doing so, users may feel that their participation is valued by the VC. Thus, users' sense of belonging may increase, which will encourage their personal involvement in the community. As a result, users are willing to spend more time in the community for sharing information in favor of others than for just seeking information for their own benefits.

### 3.6.6 Limitation and Future Research

Our research also has several limitations that call for future research. First, past behavior is not limited to tenure and extent of usage, which are examined in this research. As this research is an initial attempt to understand past behavior in VCs, we call for more research to explore other dimensions of past behavior which may generate additional insights. Second, the relative importance of past behavior may depend on the research context (e.g., types of VC, topics being discussed). In our context, the VC is open to public and primarily for information exchange of non-work-related topics. It is expected that the results may vary in VC for other purposes (e.g., social networking sites, professional VCs). Future research should further explore and conduct a comparative analysis in different types of VCs. Third, we used a self-report survey to measure tenure and extent of usage. Future research could apply more accurate methods (e.g., tracking software) to track users' real past behavior. Fourth, as we newly developed and validated measurement items for individual benefits, we call for more efforts to refine and improve the benefit constructs theoretically and methodologically.

### 3.7 Concluding Remarks

This research empirically examines the direct and moderating effects of past behavior (tenure and extent of usage) on continuance intention in VCs. As a user stays longer in a VC, he or she is more likely to continue using the VC for information consumption. Also, a user who spends more time in a VC is more likely to continue participating in the VC for information provision. The moderating effects of past behavior are not as strong as expected. Tenure only moderates the relationship between social benefits and continuance intention to consume, while extent of usage only moderates the relationship between altruistic benefits. The findings imply that VC users are rational decision-makers who carefully evaluate their individual benefits on their own before future participation.

Our model also suggests that active participation in VCs brings users various types of benefits. Users participate in VC not only for the favor of their own but also for others. The effective two-way information exchange and social interaction encourage user engagement, which will ultimately facilitate the long-term development of VCs.

## CHAPTER 4: THE SOURCES AND IMPACTS OF SOCIAL INFLUENCE IN ONLINE COMMUNITIES FOR PRODUCT RECOMMENDATION

### 4.1 Introduction

#### 4.1.1 The Definition of User Reviews

Web 2.0 is changing the design of retail websites, and thus, the way people use these websites for online shopping. 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 users 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 reviewers and reviews. In these regards, we refer to *user reviews* as user-generated recommendations *that include product star ratings, text-based reviews, reviewers' profile and past contributions*. In this study, we are interesting in understanding the role of user reviews for consumers to make purchase decisions.

#### 4.1.2 User Reviews in E-commerce

*User reviews* play an increasingly important role in E-commerce nowadays. Advances of IT digitize Word-Of-Mouth (eWOM), give individuals the ability 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 that 24% of Internet users read online reviews before paying for a service delivered offline. Of those who used an online review, 41 percent of restaurant consumers subsequently visited the restaurant recommended by reviewers, while 40 percent of hotel consumers subsequently stayed at a recommended hotel (comScore) after reading reviews. Consequently, user reviews can significantly affect the success/failure of a product, as they are closely related to sales and the firm's marketing strategy (Chen and Xie 2005; Chevalier and Mayzlin 2006). 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 discussions online.

Recently, the topic of online user reviews has aroused increasing 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., books or movies) (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; Mayzlin 2006; Trusov et al. 2009; Zhu and Zhang 2010), consumers' purchase decisions (Chevalier and Mayzlin 2006), directional eWOM effects (e.g.,

extremity effect, positivity effect, negativity effect) (Gershoff et al. 2003; Park and Lee 2009; Reinstein and Snyder 2005). From the IS perspective, online user reviews have 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; Pavlou and Dimoka 2006), the decision-making process and system evaluation (Chen et al. 2004, 2008; Kumar and Benbasat 2006; Li and Hitt 2008; Mudambi and Schuff 2010).

#### 4.1.3 The Research Gap

In spite of a great amount of research efforts, we are still faced with 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 supported that online user reviews have a significant impact on sales (Chen et al. 2008; Chevalier and Mayzlin 2006), while others provided the counter argument (Chen et al. 2004; Godes and Mayzlin 2004). Second, although consumers are more likely to trust online user reviews (peer-generated) than other sources of product information (marketer-generated) (Bickart and Schindler 2001; Smith et al. 2005), the influence of peer-generated user reviews may be exerted to a very limited extent (Jepsen 2006).

We believe that the confusion may come from the fact that the mechanism through which user reviews impact consumers' purchase decisions is missing. Most studies treat user reviews as exogenous and take it for granted (e.g., the presence of user reviews). Researchers did not consider explicitly the characteristics of user reviews that could impact consumers, in turn, product sales, etc.

#### 4.1.4 Research Objectives and Research Questions

Since online user reviews are playing an increasingly important role in consumers' purchase decisions (Chen and Xie 2008; Chevalier and Mayzlin 2006), we argue that user reviews can form powerful social influences that facilitate online consumers' perceptions about products, enhance decision quality and their evaluation of the system. In order to open the black box, it is critical for us to understand what factors affect the formation of social influence from user reviews and why and how user reviews play a role in consumers' decision making and system evaluation. Burnkrant and Cousineau (1975: p.208) stated that *“when a person is placed in a product evaluation situation in which he or she is unable to adequately assess the characteristics of the product from direct observation and contact, he or she will view the reactions of others as evidence about the “true” nature of the product”*.

However, based on the literature review, current research on the types and sources of social influence in online product recommendations is limited. To the best of our knowledge, this study is one of the few IS studies that recognize and differentiate types of social influence from user reviews, explore the sources of social influence and examine their impacts, based on Social Influence Theory (SIT) (Kelman 1961; 2006) . In addition, considering differences among consumers, this study takes into account consumer characteristics to explain the strength of social influence for different groups of consumers. The potential results will also provide practical implications for commercial websites and product manufacturers. The specific research questions are:

1. *How different types of social influence are developed from user reviews?*
2. *How different types of social influence impact product and system evaluation?*

3. *How consumer differences play a role in the formation of social influence from user reviews?*

The paper is organized as follows. Section 2 presents a literature review on user reviews. The theoretical background is discussed in Section 3, followed by hypotheses development in Section 4. The research methodology is discussed in Section 5. We present our data analysis and findings in Section 6, followed by a discussion in Section 7 with conclusions in Section 8.

#### 4.2 The Impact of User Reviews

As a new product information channel, user reviews are more user-oriented and have an advantage in helping consumers to find products matching their preferences, compared with product information provided by the website (Chen and Xie 2008). Empirical research has indicated that the success of online retail websites (e.g., Amazon.com) and online communities that provides user reviews comes not only from numerical star ratings, but also from rich text-based reviews (Ba and Pavlou 2002; Dellarocas 2003; Pavlou and Dimoka 2006). In a study of the effect of consumer reviews on relative sales of books at Amazon.com and Barnesandnoble.com, Chevalier and Mayzlin (2006) found that consumers actually read and respond to book reviews. Pavlou and Dimoka (2006) argued that star ratings and text-based reviews are two *complementary* types of consumer feedback, not mutually exclusive. The former can be easily read and interpreted, while the latter offer fine-grained information about the product, the seller, etc. In this regard, *user-generated recommendations* or *user reviews* we are interested in include both numerical star ratings and text-based reviews available online.



The growing popularity of user reviews has aroused great research interests in its diverse impacts on product sales, consumers' decision-making process, trust development, system usage and evaluation.

#### 4.2.1 User Reviews and Product Sale

A number of studies have attempted to reveal the relationship between characteristics of user reviews and product sales. Chen et al. (2004) showed that the number of consumer reviews is positively associated with online book sales, as they may reduce search costs for quality information. Liu (2006) examined user reviews in the movie industry, showing that they offer significant explanatory power for both aggregate and weekly box office revenue, and most of this explanatory power comes from the volume of reviews. Similarly, Dellarocas et al. (2007) and Godes and Mayzlin (2004) both demonstrated that the addition of online product review metrics (volume, valence, and dispersion) increases the forecasting accuracy of motion picture box office revenue. Chevalier and Mayzlin (2006) also confirmed that in the case of online bookstores, online retailers profit from providing user reviews, especially when reviews are sufficient and lengthy. However, several studies found that the relationship does not necessarily be positive. Duan et al. (2009) found that user reviews from CNet.com have impacts on downloads of less popular software, but *not* on downloads of popular software. In addition, Chen et al. (2004) pointed out that user ratings do not influence online book sales. Similarly, Duan et al. (2008) concluded that user ratings have no significant impact on movies' box office revenues, although the volume of user reviews does.

A review of this research stream shows that researchers focused on specific characteristics of user reviews to investigate their impacts on product sales, such as

volume and valence. To have a complete understanding of user reviews and their impacts, we need to look at user reviews from multiple dimensions. User reviews matter not simply because of their presence, rather they provide useful and meaningful information cues that help consumers to make purchase decisions and online retailers to make profits (Chen et al. 2008). For example, if a piece of user review does not provide any valuable information to a consumer, it offers little or no impacts on the consumer's evaluation of a product and purchase decision. Given the mixed results identified above, we believe that user reviews need to be understood in a more comprehensive way. To this end, this research goes beyond the current research by investigating the nature of user reviews from a multi-dimensional perspective.

#### 4.2.2 User Reviews and Consumers' Decision-Making

As a new type of decision aid available for online shopping, user reviews facilitate consumers' decision-making process. First, online user reviews have shown to increase the efficiency of the online search process. As Chen et al. (2004) commented, user reviews can reduce search costs for quality information and serve as a quality index for a product of interest. In the experiment of an online shopping task, Smith et al. (2005) showed that individuals do use recommendations as a means to reduce the amount of effort exerted during the online search process. They further pointed out that the availability of peer recommendation is preferred over editorial recommendation as a decision-making heuristic to reduce information search efforts and maximize learning benefits. As a result, the quality of user reviews facilitates consumers' efficiency in decision making (Chen et al. 2008; Mudambi and Schuff 2010). Chen et al. (2004) found that a higher number of reviews increase the perception of review objectivity and are

given more weight on making purchase decisions. Mudambi and Schuff (2010) showed that helpfulness of the review (e.g., the number of people who voted that the review was helpful) is related to review depth, increases the diagnosticity of the review and facilitates the purchase decision process. Similar results were attained by Chen et al. (2008) indicating that high-quality reviews are considered as more important even than the aggregate numerical ratings.

According to research on interpersonal communications (Carlson and Zmud 1999; Daft and Lengel 1986), user reviews reduce consumers' quality uncertainty about a product (Chen et al. 2004). Weiss et al. (2008) explained that when a review offers a greater amount of or more detailed information, consumers will judge it as more valuable and thus be more confident in making purchase decisions. Chevalier and Mayzlin (2006) found that customers behave "as if" the fit between customer and book is improved by using reviews to screen purchases in online book purchases.

#### 4.2.3 User Reviews and Trust in Online Transactions

User reviews can be used as an effective feedback mechanism to regulate online transactions and protect consumers. Pavlou and Gefen (2004) argued that user reviews about sellers at Amazon.com act as a sanctioning mechanism that penalizes sellers for opportunistic behavior and promotes cooperative behavior, and helps to reduce consumers' perception of risks arising from the seller community in the transaction process.

User reviews also help to develop consumers' trust in online shopping, which enhances their confidence in purchase decisions. In the context of the online buyer-seller relationship, recent IS studies have shown that trust is an important factor in the success

of online transactions. Trust comes from high-quality buyers' comments on their buying experiences (Awad and Ragowsky 2008). Pavlou and Gefen (2004) highlighted that perceived effectiveness of the feedback mechanism increases buyer trust in the community of sellers at Amazon. For example, Ebay allows buyers to post comments on their buying experiences. Ba and Pavlou (2002) argued that better feedback comments on past buying and selling experiences at Ebay positively induce a higher level of trust. Pavlou and Dimoka (2006) indicated that feedback text comments had a greater impact on a seller's credibility and benevolence than numerical ratings. In the same vein, user reviews may increase consumers' trust toward the reviewers and exerts more influence on purchase decisions. Smith et al. (2005) pointed out that the risk perceptions associated with online environment and the decision uncertainty motivate consumers to develop trust that comes from the expertise and rapport of peer recommendations.

#### 4.2.4 User Reviews and System Evaluation

Last but not least, user reviews not only help consumers to evaluate the product of interest and facilitate their purchase decision, reviewers' opinions also impact consumers' evaluation of the website. By comparing consumers who read user reviews on CDs at Amazon with those who did not before they made the purchase decision, Kumar and Benbasat (2006) found that the provision of user reviews improves consumers' perception of the usefulness and social presence of the website.

### 4.3 Theoretical Background

#### 4.3.1 Social Influence Theory (SIT)

The *Social Influence Theory* (SIT), developed by Kelman (1961, 2006) is the classical socio-psychological theory that explains an individual's socially-induced

opinion formation and behavior change. According to Kelman (1961), the social influence research traditionally focuses on the impact of social influences arising from group interaction or persuasive communication on judgments. The SIT advances the social influence research by distinguishing between different processes of social influences. 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, identification and internalization. Grounded on SIT, researchers have identified three types of social influence that correspond to the three processes respectively (Bearden and Etzel 1982; Burnkrant and Cousineau, 1975; Deutsch and Gera, 1955; Park and Lessig 1977).

*Normative influence* occurs through the compliance process, when an individual accepts influence from another person or from a group because he or she hopes to achieve a favorable reaction from them. The individual adopts the influence in order to attain specific rewards or avoid specific punishments. The individual complies with what the influencing agent wants him to do as a way of achieving a desired response from the agent. He or she does not adopt the behavior because he or she believes in its content, but because it is instrumental in the production of a satisfying social effect. An example could be an employee adopting a behavior because his supervisor wants him to do so.

*Value-expressive influence* occurs through the identification process, when an individual accepts a behavior because he or she wants to establish or maintain a satisfying self-defining relationship to another person or a group. It may take the form of taking over the role of the influencing agent. In this type of influence, an individual attempts to be like or actually to be the other person. By saying what others say and doing what

others do, he or she maintains this relationship and the satisfying self-definition that it provides him. The value-expressive influence may also occur when the self-defining relationship requires reciprocity. That is, the reciprocal-role relationship can be maintained only if the participants have mutually shared expectations of one another's behavior. Moreover, the influence may exist when an individual anchors his behavior with a reference group to maintain his self-definition as a group member. For example, an academic researcher spends a lot of time on doing research, writing and publishing papers, and serving as a reviewer for a journal or conference because he or she is expected by the university and his colleagues to maintain his self-defining relationship with the research community.

*Information influence* occurs through the internalization process, when an individual accepts influence because the content of the induced behavior is intrinsically rewarding. The individual adopts the influence because he or she finds it useful for the solution and perceives it as inherently conducive to the maximization of his values. The characteristics of the influencing agent play an important role in internalization (e.g., the agent's credibility about the contents of induced behavior). For example, a person adopts the recommendations of an expert, because he or she finds them useful to his problem and to achieve his own values.

To sum up, normative and value-expressive influences are similar in that an individual does not adopt the induced behavior because its contents are intrinsically satisfying (as in internationalization). The difference is that an individual actually believes in the opinions and actions that he or she adopts when he or she receives value-expressive influence. In contrast, in informational influence, the induced behavior

(rational or irrational) becomes part of and is integrated into a personal system, independent of the external source. In addition, Kelman (1961) emphasized that the three types of social influence are not mutually exclusive and may exist simultaneously with varying levels.

#### 4.3.2 Social Influence Theory (SIT) in the IS research

In the IS field, researchers have recognized the importance of social aspects of technology use (Venkatesh and Morris 2000). Hence, SIT is applied to understand how social influence from external sources affects an individual's intention to adopt and use systems (Venkatesh and Davis 2000). One of the most representative applications is the TAM2 model, which incorporates SIT to investigate the key determinants of TAM's perceived usefulness and usage intention (Venkatesh and Davis 2000). TAM2 models the impact of three types of social influence on adopting the new system. *Normative influence* occurs in the link between subjective norm and intention to use. For example, if an employee believes that his supervisor thinks he or she should use the system, he or she will comply with the supervisor even if he or she is not favorable toward using it. *Value-expressive influence* 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 or she would perceive that doing so will enhance his status within the group. *Informational influence* 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: pp. 189).

In addition to TAM2, a number of IS studies investigated the role of social influence in system adoption and usage from diverse perspectives. The three types of social influence have been identified in the IS literature. At the organizational level, normative influence typically comes from subjective norms from supervisors and perceived top and local management support (Wu and Lederer 2009). They signal and reinforce the importance of the technology to the organization, leading to significant effects on behavioral intention to use the system (Taylor and Todd 1995; Lewis et al. 2003; Venkatesh and Morris 2000). At the individual level, Hsu and Lu (2004) found that social norms from colleagues are positively related to the intention to play online games. The value-expressive influence occurs when an individual uses the system in order to feel a sense of belonging to a group of his colleagues or friends (Lewis et al. 2003; Malhotra and Galletta 1999). Hong and Tam (2006) supported that in value-expressive influence, using mobile services can be a way to maintain membership and secure support through increased interactions within the group of colleagues or friends. The membership could be instrumental in achieving a valued outcome, such as enhancement of a user's social image within the social group (Kim et al. 2005; Venkatesh et al. 2003). Informational influence exists when compelling messages received from important others are internalized into an individual's own belief structure, thus influencing one's cognition about the expected outcomes of technology use (Hsu and Lu 2004; Lewis et al. 2003). Research has indicated that informational influence is positively related to attitudes toward using the technology and the adoption intention (Malhotra and Galletta 1999; Hong and Tam 2006)



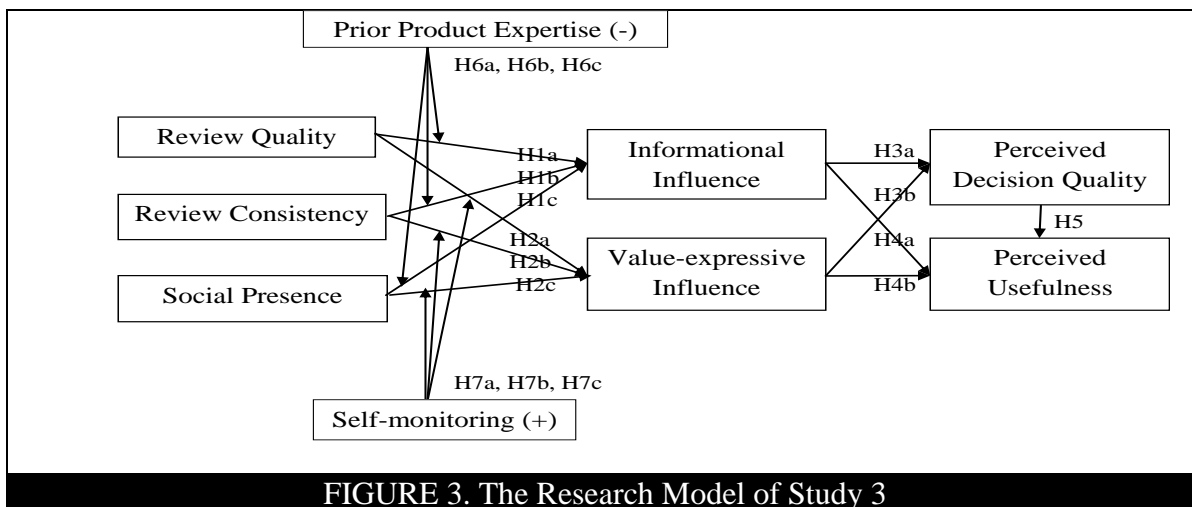
Based on the review, this research attempts to bridge the following research gaps. First, research on social influence in the IS field focuses on who exerts influence on an individual's system adoption, i.e., mostly from supervisors, peers, or friends. However, how social influence is developed from these sources is not explicitly examined. In other words, we have limited knowledge about what are the characteristics of these sources that affect the formation of 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 study, 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 others and accept online recommendations.

The gaps we are trying to bridge differentiate this study from the existing IS studies on social influence. This study aims to understand how social influence from user reviews is developed within the system and its impacts on consumers' product and system evaluation. In particular, we investigate the antecedents of different types of social influence from user reviews available in the online setting for product purchase and how different types of social influence affect consumers' decision making. We also take into account the role of consumer characteristics to explain potential differences among consumers in developing social influence.

#### 4.4 Hypotheses Development

Drawing on Social Influence Theory (SIT), we differentiate between two types of social influence that are common in E-commerce websites: *informational influence* and *value-expressive influence*. Normative influence is excluded from the model for the following reasons. First, 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 makes purchase decision on his own independently. A consumer may seek information and advice from others, but he or she does not need to comply with anyone else to make his personal decision. Second, according to SIT, an individual adopts the normative influence in order to attain certain specific rewards or avoid certain specific punishments. These rewards or punishments are typically from external sources (e.g., supervisors). In our research context, rewards or punishments can be considered as pros and cons of using a product, they come from consumers who are using the product, not from external sources (e.g., reviewers). In these regards, the normative influence is not applicable to our research context.

Next, based on SIT (Kelman 1961; 2006), we identify three determinants of social influence from user reviews: *review quality*, *review consistency* and *social presence*. We discuss how these determinants impact the formation of social influence from user reviews. Then, we propose how social influence affects *product evaluation and system evaluation*. Moreover, 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 influences. Below is the research model (Figure 3).



#### 4.4.1 Determinants of Informational Influence: The Internalization Process

##### Informational Influence

*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).

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 via interactions with other people for the sources of actionable knowledge such as solutions, problem reformulation and validation (e.g., developing confidence and support by others in solutions and plan). Mannes (2009) examined the intuitions about group wisdom and informational influence

of groups. The experiment results showed that groups and teams play a significant role in organizations and individuals rely more on groups than other individuals to improve and update their beliefs.

Moreover, social network research focuses on the impact of strength of ties among individuals for obtaining information. This stream demonstrates that the strength of ties impacts the diffusion of innovation and information (Granovetter 1973). Two types of ties are identified: strong ties and weak ties. In contrast to strong ties, weak ties are defined as connections among individuals who do not know each other with distant and infrequent interaction (Granovetter 1973). In their study of electronic weak ties exchange, Constant et al. (1996) supported the argument 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 potential to provide novel and non-redundant knowledge.

As discussed earlier, in the online environment, consumers are relying more on other consumers' opinions to evaluate products and make their purchase decisions. The online retail websites and online communities provide a platform for consumers to develop weak tie relationships in which they do not know each other before. The relationship allows reviewers to share information and facilitates consumers' knowledge-building process from diverse perspectives, given that reviewers have different usage experiences. Thus, user reviews will help consumers to have a better understanding of the product and increase their confidence in product selection.

In these regards, informational influence is likely to occur from user reviews. It reflects the permanent internalization process of a group's judgment to form veridical beliefs about reality (Mannes 2009), primarily from the information communicated from another person (Bagozzi and Lee 2002). In our research context, informational influence is defined as *the extent to which an individual is influenced by reviewers in enhancing his knowledge of a product for making a purchase decision* (Deutsch and Gerard 1955; Park and Lessig 1977).

### Review Quality

The first determinant of informational influence is review quality. It 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 (Chen and Xie 2008). By knowing other consumers' real experiences of using a product, consumers will be able to understand the product better and evaluate it more effectively. In a comparative analysis of user-generated reviews vs. marketer-generated reviews, Bickart and Schindler (2001) found that user-generated reviews are preferred because they are perceived as more credible, useful and relevant. Smith et al. (2005) argued that, when a review is from an expert or experienced consumer, an individual is more likely to be influenced by the reviewer as it is considered more reliable and useful. Quality reviews also would receive more precedence and weight in judgment and choice processes, leading to greater persuasive power of the reviews (Feldman and Lynch 1988).

Most of the online retailers and third-party websites allow users to evaluate the quality of user reviews not only from the contents but also from reviewers' information (e.g., personal profile, past contributions in the community and site-certified quality control). For example, Amazon assigns a badge to a reviewer to indicate his identity or acknowledge his past contributions (e.g., Top 10 reviewers, Real Name), and Epinion implements a similar way to manage reviews. As a result, a consumer can utilize multiple information sources to judge the quality of reviews.

According to SIT, one of the conditions under which informational influence is developed is the manner of achieving the induced behavior that is 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 understand the product better and evaluate it 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, changing individuals' attitudes and beliefs toward adoption decisions (Bhattacharjee and Sanford 2006; Sussman and Siegel 2003). Zimmer et al. (2007) pointed out that individuals are more likely to use high quality information because it requires minimal clarification and refinement. Following the same logic, we believe that the quality of user reviews will play a significant role in developing informational influence for online consumers, and thus we hypothesize:

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

### Review Consistency

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

Research on group influence has indicated its strong impact on individual judgments. Mannes (2009) found that people relied more on groups than individuals to update their beliefs. 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). Similarly, Zhang et al. (2007) investigated the majority influence as a proxy for social influence on individuals' decision making. According to their view, a majority can be defined in terms of the number of members in the group. More specifically, a majority is formed when group members hold consistent opinions or attitudes. According to convergence theory, the majority facilitates convergence of attention, thoughts, and alternatives (Moscovic 1981). The theory posits that "*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). Another view of majority influence assumes that movement to a majority position is attributed to two assumptions (Nemeth 1986). One assumption is that majority judgments give information about reality, therefore likely to be correct. According to Nemeth (1996), this is generally considered as informational influence. 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 represent 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, social orientation focuses on the personal feelings of intimacy and warmth based on users' experience of 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 a user to experience others as being psychologically present* (Short et al. 1976).



Social presence is rooted in the research on organizational communication. Social presence theory is one of the theories that examine the effectiveness of a communication media (Short et al. 1976). The theory posits that there is a fit between certain forms of media chosen for specific types of interaction and task information requirements. 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. Social presence is closely related to information richness developed from media richness theory. 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). Media such as face-to-face communication are considered as information-rich, and thus, preferred for complicated tasks to reduce equivocality and ambiguity, Media such as Email are information-lean for simple tasks. Traditionally, rich media is high in social presence while lean media low in social presence.

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 consumers to feel sociability, warmth and sensitivity to their needs from the website. Social presence is particularly salient in the online recommendation systems where 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 a website can respond to consumers' needs as if it were a surrogate for humans, instead of a surrogate for the machine-like intelligence embodied in the online transactions (e.g., displaying product information or check-out) (Gefen and Straub 2003). Thus, it captures

the social aspect, not the operational aspect of a website. In our context, the more an online recommendation system can satisfy consumers' needs for valuable and constructive reviews, the more likely they will feel a sense of human sociability, warmth and sensitivity of the website. For example, Amazon and Epinions.com take a personal approach, posting a short biographical sketch of each reviewer and past contributions in the community. In addition, quality control mechanisms are implemented. For example, Amazon acknowledges a reviewer with a badge (e.g., Top Reviewer) to indicate his dedication to offering reviews and allow consumers to rate the review. When the website provides consumers with different information cues to user reviews, consumers are more likely to trust the website and reviewers (Kumar and Benbasat 2006; Cyr et al. 2009). Consequently, it is much easier for consumers to decide whether to follow others' opinions (Smith et al. 2005). 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.*

#### 4.4.2 Determinants of Value-expressive Influence: The Identification Process

##### Value-expressive Influence

The second type of social influence based on SIT is value-expressive influence. *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 Cousinea 1975; Park and Lessig 1977). There are two forms of identification (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 value-expressive influence is present, individuals seek to believe and act in a manner similar to those referents.

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 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. Consumers are interested in knowing how others like the product, and use others' opinions as a benchmark to form their own preferences.

In our research context, value-expressive influence 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 for making a purchase decision* (Deutsch and Gerard 1955; Park and Lessig 1977).

### Review Quality

As discussed earlier, review quality is closely related to consumers' understanding of the product. When the quality of user reviews is high (e.g., in-depth, useful, reliable), the value of reviews increases as they present a comprehensive picture

of a product (Bickart and Schindler 2001). According to SIT, the identification process 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. High-quality reviews facilitate consumers to effectively associate themselves with reviewers. High-quality reviews also increase reviewers' credibility perceived by consumers. Since information from a trustworthy source can lead to 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 correct opinion, people identify with and are influenced need by that majority (Baker and Petty 1994). Hence, 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 with others in the social environment. 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 with the website. When consumers read user reviews, they are concerned about the trustworthiness of review contents (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 can make information about reviewers and their past contribution available for consumers when they read reviews. By providing them multiple means to evaluate reviews, 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.*

#### 4.4.3 Impacts of Social Influence

##### Perceived Decision Quality: Product Evaluation

Perceived decision quality has been widely examined to capture the effectiveness of software-based agents that provide product recommendations based on certain rules (Haubl and Trifts 2000) and users' performance in E-commerce (Hostler et al. 2005). Decision quality can be assessed by objective or subjective measures of quality of consumers' purchase decisions (Xiao and Benbasat 2007). The objective measures include: (1) whether a product chosen by a consumer is a non-dominated or dominated alternative, (2) the degree to which the final choice of the consumer matches the preferences a consumer has expressed, (3) the quality of the consideration set, and (4) product switching (Haubl and Trifts 2000; Pereira 2001; Swaminathan 2003). The

subjective measure is consumers' confidence in their purchase decision or product choice (Hostler et al. 2005; Swaminathan 2003).

This study focuses on the overall perception of user reviews for a particular product perceived by customers. Users do not need to make decisions on product selection among a number of recommended alternatives as in the software-based recommendation agents. Instead, they only need to decide whether they will follow reviewers' opinions when the product is given. Thus, objective measures of decision quality are not applicable to our research context. The subjective measure of decision quality, *perceived decision quality*, refers to *the degree of a consumer's confidence in his decision-making on purchase decisions* (Haubl and Trifts 2000; Xiao and Benbasat 2007).

Research has indicated that use of software-based recommendation agents improves decision quality (Haubl and Trifts 2000; Pereira 2000, 2001; Xiao and Benbasat 2007). Less attention is paid to the role of user-generated recommendations (e.g., user reviews) in decision quality. In our view, it is not guaranteed that user reviews on its own have positive impact on consumer decision quality. For example, when a review is perceived as useless, it will add little value to consumers. As a result, the review may not generate any strong influence to consumers. In this regard, it is the extent to which social influence develops from user reviews that will enhance decision quality. Once consumers are influenced by user reviews, they will feel confident in their purchase decisions. According to our model, there are two types of social influence that are positively associated with perceived decision quality.

When consumers obtain informational influence from user reviews, their knowledge about the product will be enhanced by internalizing reviewers' comments into their own value system. With personal knowledge accumulated, informational influence can increase the efficiency of the online search process (Smith et al. 2005) and reduce consumers' uncertainty about a product (Weiss et al. 2008). According to SIT, informational influence allows consumers to maximize their individual value they receive from the system if they follow reviews' opinions to buy the product or not. As a result, consumers will feel more confident in making purchase decisions as user reviews enhance their knowledge internally.

Meanwhile, when consumers receive value-expressive influence from users, they are influenced by a group of people who have used the product. According to SIT, consumers may anchor their decisions with the group opinion to identify themselves within the social environment. When they perceive that a majority of reviewers hold convergent opinions, consumers can make decisions more easily with the support of a group of people. Also, by following what others are doing, consumers may feel comfortable about their decisions. Thus, we hypothesize:

**H3a:** *Informational influence is positively associated with perceived decision quality.*

**H3b:** *Value-expressive influence is positively associated with perceived decision quality.*

#### Perceived Usefulness: System Evaluation

When a retail website provides valuable user reviews that facilitate consumers' decision making on product selection, consumers will have positive evaluations of the

usefulness of website itself (Kumar and Benbasat 2006). Perceived usefulness is a well-validated salient belief about system performance in IS adoption research (Davis et al. 1989; Venkatesh et al. 2003). It has been consistently shown to be the most influential variable from a system perspective (Kumar and Benbasat 2006; Venkatesh et al. 2003). In this research, perceived usefulness refers to *the extent to which an individual perceives a website to be useful in evaluating a product and making a purchase decision* (Gefen and Straub, 2003; Kumar and Benbasat 2006).

Empirical work indicates that social influence from user reviews help consumers reduce information uncertainty and increase information search efficiency (Chen et al. 2004; Smith et al. 2005). This enables consumers to reduce search costs without seeking information from additional sources. As a result, social influence facilitates the decision-making process (Chen et al. 2008; Mudambi and Schuff 2010). When they are influenced by user reviews that help them to better understand the product, consumers will perceive that the website is helpful in providing valuable information and facilitating purchase decisions. When they want to be like a group of consumers who provide consistent opinions, consumers will perceive that the website accelerates their decision-making process and increases the decision-making efficiency. Consequently, we hypothesize:

**H4a:** *Informational influence is positively associated with perceived usefulness of the website.*

**H4b:** *Value-expressive influence is positively associated with perceived usefulness of the website.*



When user reviews make a consumer confident in his purchase decisions, he or she will perceive that the website is helpful in providing these reviews and facilitates his decision-making. Thus, we hypothesize:

**H5:** *Perceived decision quality is positively associated with perceived usefulness of the website.*

#### 4.4.4 Moderation Effects of Consumer Characteristics

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 consumer characteristics play a role in the formation of social influence: prior product expertise and self-monitoring.

##### Prior Product Expertise

Prior 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 processes: own-based and other-based. In the own-based decision-making process, consumers rely on themselves to search for information, evaluate the product and make purchase decisions, while in the other-based decision-making process, consumers subcontract either part or all of their decision-making process (Xiao and Benbasat 2007). Expert consumers are more likely to adopt an own-based strategy as they have the capacity to process information and make decisions; in contrast, novice consumers are more likely to adopt an 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 out that in software-based recommendation agents, individuals who have low product knowledge tend to have lower satisfaction with 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, prior product expertise is expected to moderate the formation of informational influence. When consumers are very knowledgeable about a product, they will apply their own knowledge with limited help from others. When consumers have low product knowledge before reading reviews, they will rely on others' 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. User reviews will be more likely to be internalized by a consumer with low product expertise. Thus, we hypothesize:

**H6a:** *Prior product expertise weakens the relationship between review quality and informational influence from user reviews.*

**H6b:** *Prior product expertise weakens the relationship between review consistency and informational influence from user reviews.*

**H6c:** *Prior product expertise weakens the relationship between social presence and informational influence from user reviews.*

Self-monitoring

Self-monitoring is introduced to understand individual differences in the extent to which they can regulate behaviors and self-presentation in social contexts (Snyder 1974). Research on self-monitoring has differentiated individuals with high self-monitoring from those with low self-monitoring (Lennox and Wolfe 1984; O’Cass 2000; Snyder 1983; Snyder and Gangestad 1986). 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. High self-monitors regulate their behavioral choices on the basis of situational information. The impact of situational and interpersonal cues of social appropriateness is considerable. In contrast, individuals with low self-monitoring are relatively insensitive to social cues and tend to maintain a consistent self-presentation across different situations. Low monitors are less responsive to situational and interpersonal specifications of behavioral appropriateness. Compared with high monitors, their behaviors exhibit more substantial cross-situational consistency and temporal stability, reflecting the underlying traits, dispositions, attitudes, and other personal attributes.

The concept of self-monitoring has traditionally been of interesting to marketing research trying to understand consumer behaviors. Becherer and Richard (1978) indicated that self-monitoring as a moderator increases the ability of personality traits to predict brand choice. The moderation effect is strongest among low self-monitors as they tend to remain true to their internal self-image, suggesting that personality influences behaviors more for low self-monitors. Shavitt et al. (1992) found that for social identity products, high self-monitors explained their attitudes in more social terms and in less utilitarian terms than did low self-monitors. In addition, when advertising function products, high

self-monitors preferred social arguments while low self-monitors preferred utilitarian arguments. Browne and Kaldenberg (1997) showed that overall consumer involvement with a product was significantly related to self-monitoring, with high self-monitors experiencing more product involvement than low self-monitors. Hence, high-monitors are more likely to buy a branded product to achieve a sense of belonging.

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 others and follow them through the identification process. As 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. Consumers with high self-monitoring tend to identify themselves more easily with others than their counterparts. As a result, we expect:

**H7a:** *Self-monitoring strengthens the relationship between review quality and value-expressive influence from user reviews.*

**H7b:** *Self-monitoring strengthens the relationship between review consistency and value-expressive influence from user reviews.*

**H7c:** *Self-monitoring strengthens the relationship between social presence and value-expressive influence from user reviews.*

## 4.5 Research Methodology

### 4.5.1 Experiment site and product selection

We conducted a survey in a controlled lab environment to validate the research model. The controlled environment ensures participants' real-time impression and

evaluation on a particular product. It allows us to control confounding factors that may interfere with the causal relationships hypothesized in the model. One confounding factor could be that participants seek product information from other sources (e.g., product official website; expert or editor reviews) than user reviews. Another factor could be that participants take the survey without reading user reviews. If that is the case, user reviews may not generate any influence to them, which does not meet the research objectives of this study. A pilot study was conducted to make sure that survey procedures are properly set and survey items could be understood correctly.

In this survey, the scenario is asking potential consumers to make a purchase decision on a product based on user reviews provided by a commercial website. Amazon.com was selected as the website in this survey. Amazon.com is an ideal site because it provides excellent support for online communities and has rich user base for user reviews section (Kumar and Benbasat 2006). As a number of IS research studies studied user reviews in Amazon.com (Kumar and Benbasat 2006; Mudambi and Schuff 2010), we are able to compare our results with others in a consistent way.

We chose the digital camera as the product for this study. The participants were asked to make purchase decisions based on user reviews of the camera. 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 products in the Consumer Electronics Association's annual ownership study (Raymond 2006). Second, Internet has been the most popular channel for consumers to buy digital cameras (Photo Marketing Association International 2001).

A number of cameras released in Amazon.com between 2008-2010 at a price around \$200 were selected. 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.

#### 4.5.2 Instrument development

The survey adopted existing items whenever possible and measured using 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 8 first-order sub-constructs. As each quality dimension represents a portion of the overall quality, review quality is modeled as a second-order formative construct (Petter et al. 2007). The dimensions of review quality include adequacy, depth, reliability, usefulness, objectivity, recency, understandability and conciseness. All of the dimensions are reflective first-order constructs.

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 are adopted from the social influence research (Bearden et al. 1989; Deutsch and Gerard 1955; Park and Lessig 1977). The items for decision quality and perceived usefulness are adopted from existing scales on the research of E-commerce

recommendation systems and system performance respectively (Davis 1989; Gefen and Straub 2003; Haubl and Trifts 2000; Hostler et al. 2005; Kumar and Benbasat 2006; Pereira 2000, 2001; Xiao and Benbasat 2007). We also use validated items for product expertise and self-monitoring (Kramer 2007; Lennox and Wolfe 1984; O’Cass 2000; Pereira, 2000). All constructs except review quality are reflective first-order. Below is the summary of survey constructs (Table 17). The survey items are provided in Appendix B.

<b>TABLE 17. A Summary of Constructs Used in the Survey of Study 3</b>			
<b>Construct</b>	<b>Definition</b>	<b># of Items and Type</b>	<b>Supporting Literature</b>
Review Quality	a person’s evaluation of the system’s performance in providing user reviews based on his experience of using the system	Formative second-order  reflective first-order constructs: adequacy; depth; reliability; relevancy; objectivity; recency; conciseness; understandability	Kahn et al. 2002; Lee et al. 2002; McKinney et al. 2002; Nelson et al., 2005; Wang and Strong 1996; Zhu and Zhang 2010
Review Consistency	the extent to which there is a convergence among a group of reviewers in terms of their opinions of the product	3 Reflective	Baker and Petty 1994; Moscovic 1981; Nemeth 1986; Zhang et al. 2007
Social Presence	the extent to which a medium allows a user to experience others as being psychologically present	3 Reflective	Cyr et al. 2009; Gefen and Straub 2003; Kumar and Benbasat 2006; Qiu and Benbasat 2009
Informational Influence	the extent to which an individual is influenced by reviewers as enhancing his knowledge of a product	4 Reflective	Bearden et al. 1989; Deutsch and Gerard 1955; Park and Lessig 1977
Value-expressive Influence	the extent to which an individual is influenced by a group of reviewers as the reference group to enhance his self-concept	7 Reflective	Bearden et al. 1989; Deutsch and Gerard 1955; Park and Lessig 1977
Perceived Decision Quality	the degree of a consumer’s confidence in making a purchase decision	4 Reflective	Gefen and Straub 2003; Haubl and Trifts 2000; Hostler et al. 2005; Kumar and Benbasat

			2006; Pereira 2000, 2001; Xiao and Benbasat 2007
Perceived Usefulness	the extent to which an individual perceives a website to be useful in evaluating a product	3 Reflective	Davis 1989; Gefen and Straub 2003; Kumar and Benbasat 2006
Product Expertise	the user's knowledge about or familiarity with the intended product	6 Reflective	Kramer 2007; Pereira 2000; Xiao and Benbasat 2007
Self-monitoring	the extent to which people regulate their self-presentation by tailoring their actions in accordance with immediate situational cues or social cues.	13 Reflective	Lennox and Wolfe 1984; O'Cass 2000; Snyder 1974; Snyder and Gangestad 1986

#### 4.5.3 Survey Participants

The survey was conducted in the spring, summer and fall semesters of 2011. With the instructors' permission, we recruited undergraduate students from a number of IS and marketing classes to participate the survey (Appendix C). To encourage participation, twenty \$20 Amazon.com gift cards were given away based on a random raffle drawing.

#### 4.5.4 Survey Procedures

The controlled survey was conducted in a computer lab. Before the survey, the webpage of user reviews for each selected product was opened in each computer. When participants came to the lab, they were randomly assigned to seats. At the beginning of the survey, we distributed and read the instructions to the participants (Appendix D). In order to make sure that participants were at the same pace in the survey, system features of Amazon.com user reviews were demonstrated to them (Appendix E).

Before they take the survey, the participants were instructed to read user reviews for a given product within 20 minutes. They were allowed to click on the pages that



contained user reviews and the reviewers' profiles. When they finished reading reviews and felt confident in making the purchase decisions, they were asked to complete a survey that recorded their evaluation of user reviews, purchase decisions, and system performance. To make sure that participants followed the instructions to do the survey, Camtasia (a motion-recording software) was used to record participants' browsing activities.

#### 4.6 Data Analysis and Results

The total sample size is 270. As a rule of thumb, the sample size should be 10 times the number of items in the construct with most measurement items (Chin 1998). Since review quality has 19 items, the minimum sample size should be 190 to validate the research model. Thus, the current sample size is sufficient to run the model. Table 18 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%

Similar with Study 1, SPSS was used to prescreen the dataset and did not find univariate normality, linearity or multicollinearity problems. However, as the dataset violated the assumption of multivariate normality and the model contains a formative construct (review quality), the PLS-based structural equation modeling (SEM) technique (SmartPLS 2.0, developed by Ringle et al. 2005) was used to validate the model (Chin 1998). In addition, PLS-based SEM is appropriate when the model is exploratory in nature.

#### 4.6.1 The Measurement Model

SmartPLS 2.0 was used to run confirmatory factor analysis and assess construct reliability, convergent validity and discriminant validity. Several items were dropped due to low factor loadings.

Reliability is evaluated by computing AVE (Average Variance Extracted), CR (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; Fornell and Larcker 1981). Table 19 summarizes the reliability results. All the indices are well above the cut-off values except the Understandability dimension of review quality (0.66). Considering that its AVE and CR are good and Cronbach's Alpha is slightly lower than 0.7, the understandability construct could be treated as reliable.

Convergent validity reflects the extent to which the items for each construct are measuring the same construct. If the factor loading of an item on its designated construct is 0.60 or more, convergent validity is established (Chin et al. 1997; Kim and Son 2009). Table 19 shows that all the items meet this requirement and are significant at the 1% level.

Construct		AVE	Composite Reliability	Cronbach's Alpha	Items	Parameter Estimate	T value
Review Quality	Adequacy (Adeq)	0.66	0.86	0.75	Adeq1	0.77	20.32
					Adeq2	0.81	28.87
					Adeq3	0.86	45.28
	Depth (Dept)	0.65	0.85	0.73	Dept1	0.79	23.92
					Dept2	0.78	17.82
					Dept3	0.86	40.48
	Reliability (Reli)	0.64	0.87	0.81	Reli1	0.80	28.84
					Reli2	0.82	25.60
					Reli3	0.80	25.97
					Reli4	0.77	22.64
Relevancy	0.68	0.86	0.76	Rele1	0.83	27.43	

	(Rele)				Rele2	0.80	15.35
					Rele3	0.84	29.39
	Understandability (Unde)	0.60	0.81	0.66	Unde1	0.81	22.55
					Unde2	0.61	6.50
					Unde3	0.88	49.21
	Conciseness (Conc)	0.65	0.85	0.74	Conc1	0.78	15.79
					Conc2	0.81	29.00
					Conc3	0.83	28.80
	Review Consistency (RC)	0.63	0.83	0.70	RC1	0.87	26.12
RC2					0.84	19.33	
RC3					0.64	5.26	
Social Presence (SP)	0.63	0.89	0.85	SP1	0.76	17.44	
				SP2	0.78	24.85	
				SP3	0.73	21.37	
				SP4	0.85	47.84	
				SP5	0.85	44.79	
Informational Influence (II)	0.66	0.89	0.83	II1	0.88	40.42	
				II2	0.89	60.04	
				II3	0.70	11.31	
				II4	0.77	18.14	
Value-expressive Influence (VI)	0.58	0.91	0.88	VI1	0.67	17.66	
				VI2	0.67	16.19	
				VI3	0.69	16.79	
				VI4	0.81	32.22	
				VI5	0.86	52.64	
				VI6	0.79	25.35	
				VI7	0.81	29.06	
Perceived Decision Quality (PDQ)	0.78	0.93	0.90	PDQ1	0.91	38.35	
				PDQ2	0.89	35.37	
				PDQ3	0.84	25.79	
				PDQ4	0.88	35.58	
Perceived Usefulness (PU)	0.63	0.91	0.88	PU1	0.76	22.59	
				PU2	0.83	28.61	
				PU3	0.75	18.67	
				PU4	0.82	30.34	
				PU5	0.80	25.20	
				PU6	0.80	24.75	
Prior Product Expertise (PPE)	0.72	0.93	0.90	PPE1	0.77	6.25	
				PPE2	0.88	7.52	
				PPE3	0.85	8.97	
				PPE4	0.87	7.18	
				PPE5	0.86	6.88	
Self-monitoring (SM)	Ability to modify self-presentation (SP)	0.57	0.87	0.81	SMSP1	0.79	30.40
					SMSP2	0.76	19.22
					SMSP3	0.75	23.21
					SMSP4	0.74	20.14
					SMSP5	0.72	13.95
	Sensitivity to expressive behavior of others (EB)	0.57	0.87	0.81	SMEB1	0.73	13.02
					SMEB2	0.76	24.41
					SMEB3	0.78	23.90
					SMEB4	0.82	35.44
					SMEB5	0.66	12.90

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 20 shows that all the square roots of AVEs on the main diagonal are greater than the pairwise correlations between constructs on the off diagonal, implying that all the constructs are distinct.

TABLE 20. Discriminant Validity of Study 3

	Mean	S.D.	AVE	Adeq	Age	Conc	Dept	Educ	Fami	Gen	II	PDQ	PU	Phot	PPE	Rel	Reli	RC	SMEB	SMSP	SP	Unde	VI
Adequacy	3.76	0.66	0.66	0.81																			
Age	1.15	0.47	1	-0.12	1																		
Conciseness	3.66	0.6	0.65	0.29	0.02	0.81																	
Depth	3.77	0.69	0.65	0.65	-0.14	0.36	0.81																
Education	3.51	0.68	1	0.03	0.08	0	0.03	1															
Familiarity	3.27	1.23	1	0.01	-0.1	0.03	-0.01	0.05	1														
Gender	1.43	0.5	1	0.04	-0.04	-0.03	0.17	-0.11	-0.22	1													
Informational Influence	4.02	0.66	0.66	0.53	-0.15	0.23	0.43	-0.04	0.02	0.02	0.81												
Perceived Decision Quality	4.01	0.83	0.78	0.07	0.01	0.11	0.03	0.17	0.06	-0.03	0.09	0.88											
Perceived Usefulness	4.01	0.63	0.63	0.54	-0.03	0.28	0.51	0.14	0.14	-0.03	0.46	0.24	0.79										
Photography	2.76	0.97	1	0.02	0	0.05	-0.06	-0.01	0.06	0.23	0.04	-0.05	-0.07	1									
Prior Product Expertise	3.82	0.72	0.72	0.07	-0.07	0.07	0.05	-0.01	0.17	0.08	0.12	0.13	0.01	0.29	0.85								
Relevancy	3.92	0.58	0.68	0.72	-0.11	0.4	0.67	0.03	0.03	0.06	0.61	0.08	0.62	0.02	0.11	0.82							
Reliability	3.44	0.56	0.64	0.6	0.02	0.44	0.55	0.01	-0.04	0.1	0.49	0.06	0.45	0.05	0.02	0.6	0.8						
Review Consistency	3.23	0.78	0.63	0.34	0.01	0.36	0.41	-0.04	-0.05	0.05	0.19	0.04	0.26	-0.08	-0.07	0.32	0.33	0.79					
SMEB	3.92	0.52	0.57	0.09	-0.03	0.12	0.15	0.02	0	0.11	0.11	0.11	0.14	-0.03	0.02	0.14	0.04	0.12	0.75				
SMSP	3.85	0.55	0.57	0.27	-0.08	0.29	0.24	0.02	0.06	-0.03	0.29	0.04	0.29	-0.02	-0.03	0.33	0.33	0.21	0.4	0.75			
Social Presence	3.43	0.69	0.63	0.24	-0.17	0.2	0.31	-0.02	0.05	0.06	0.22	-0.02	0.25	0.08	0.11	0.29	0.25	0.17	0.09	0.15	0.79		
Understandability	4.02	0.51	0.6	0.44	-0.08	0.53	0.5	0.03	-0.01	0.06	0.4	0.19	0.37	0.01	0.12	0.53	0.49	0.31	0.11	0.3	0.2	0.77	
Value-expressive Influence	2.65	0.78	0.58	0.32	-0.11	0.21	0.37	-0.01	0	-0.04	0.19	-0.08	0.18	0.06	-0.05	0.26	0.33	0.3	-0.05	0.17	0.57	0.11	0.76

#### 4.6.2 The Structural Model

Then, the structural model and hypotheses were validated in SmartPLS 2.0. A bootstrapping procedure with 500 iterations was performed to examine the statistical significance of the weights and loadings of sub-constructs and the path coefficients (Chin 1998).

As review quality is a second-order formative construct, Table 21 shows the weights of its sub-constructs. All the weights are significant at the 1% level.

Second-order Construct	First-order Construct	Weights	T-Value
Review Quality	Adequacy	0.23***	16.46
	Depth	0.21***	15.86
	Reliability	0.29***	16.41
	Relevancy	0.24***	13.84
	Understandability	0.16***	9.60
	Conciseness	0.14***	8.22

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

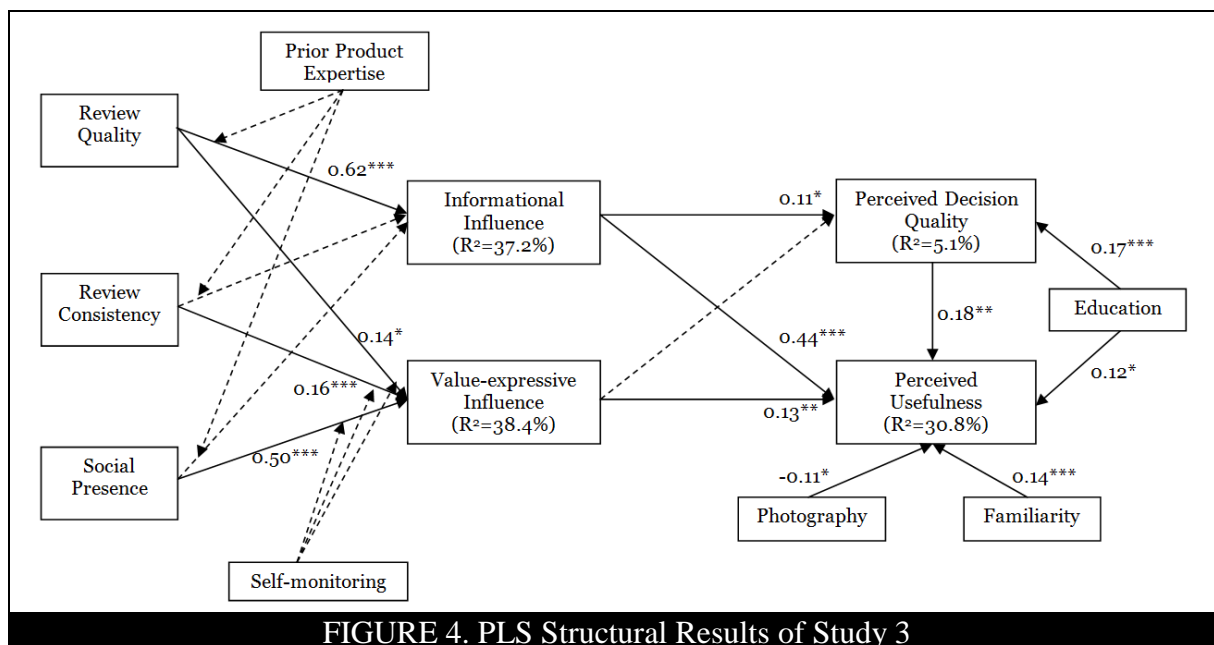
As self-monitoring is a second-order reflective construct, Table 22 shows the loadings of its sub-construct. All the loadings are significant at the 1% level.

Second-order Construct	First-order Construct	Loadings	T-Value
Self-monitoring	Ability to modify self-presentation	0.84***	33.85
	Sensitivity to expressive behavior of others	0.83***	30.87

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

Figure 4 below shows the path coefficients and  $R^2$  of the model. Informational influence is formed primarily through review quality, which accounts for 37.2% of the total variances. Thus, H1a is supported while H1b and H1c are rejected. In contrast, value-expressive influence is jointly affected by review quality (H2a), review consistency (H2b) and social presence (H2c), which account for 38.4% of the total variance. In terms

of the impacts of social influence, informational influence marginally impacts consumers' perceived decision quality (H3a) but value-expressive influence does not (H3b). Information influence only accounts for 5.1% of the total variance. As expected, perceived usefulness of the website is significantly affected by both informational (H4a) and value-expressive influence (H4b). In addition, perceived decision quality is shown to impact perceived usefulness (H5). All three factors account for 30.8% of the total variance of perceived usefulness. Surprisingly, none of the moderating relationships are significant as hypothesized. In other words, prior product expertise does not play a role in the formation of informational influence. Neither does self-monitoring in the formation of value-expressive influence.



**FIGURE 4. PLS Structural Results of Study 3**

\*\*\* Significant at the 1% level of significance    \*\* Significant at the 5% level of significance  
\* Significant at the 10% level of significance

In terms of model validity, informational influence ( $R^2=0.372$ ) and value-expressive influence ( $R^2=0.384$ ) are described as moderate, while perceived decision quality ( $R^2=0.051$ ) and perceived usefulness ( $R^2=0.308$ ) are described as weak (Chin

1998). In addition, the model has approximately large effect size for informational influence, value-expressive influence and perceived usefulness, small effect size for perceived decision quality, based on the  $f^2$  values (Henseler et al. 2009).

#### 4.6.3 Control variables

Among the control variables, education is positively related to perceived decision quality and perceived usefulness. A consumer's interest in photography is negatively related to perceived usefulness. When a consumer is more familiar with the website, he or she is more likely to perceive it usefulness in helping him making a purchase decision.

#### 4.7 Discussion

The model examines the antecedents and outcomes of social influence developed from user reviews in online commercial website. Also, consumer characteristics such as prior product expertise and self-monitoring are incorporated in better understanding the formation of social influence.

##### 4.7.1 The Formation of Informational Influence

The model indicates that user reviews do help to form social influence. However, the mechanism for developing the two types of social influence is different.

Informational influence is likely to occur when consumers seek information from user reviews to make a purchase decision. Based on the results, informational influence is primarily developed through review quality.

When reviews are reliability, relevant, understandable, or concise with adequate amount and in-depth discussion, they will be perceived as high quality. High-quality reviews allow consumers to better know a product and to evaluate it more effectively. Hence, high-quality reviews help to reduce consumers' uncertainty about the product and



enhance their product knowledge so that they can make informed decisions. When consumers perceive that reviews are of high-quality, they are more likely to be influenced by reviewers' personal experiences of using the product, leading to stronger informational influence.

It is found that review consistency does not significantly contribute to the formation of informational influence. When reviews are perceived as consistent, it means that the majority of the reviewers hold similar opinions in terms of star ratings and detailed comments on usage experiences. Meanwhile, Amazon.com provides a summary chart indicating the number of reviews for each star rating. This feature gives consumers a quick overview of reviewers' opinions before they start reading reviews. The model implies that user review may not help consumers enhance their product knowledge as a result of the presence of consistent reviews. Consumers do not necessarily need to read enough reviews to evaluate the product and make the purchase decision. When the summary indicates high consistency among reviews, consumers are likely to rely on this single clue to form product impressions and guide their decision-making. In this sense, consistent reviews do not lead to greater informational influence.

Similarly, social presence has limited impact in developing informational influence. In this context, social presence represents the extent to which the website allows a consumer to experience others as being psychologically present. In the case of Amazon.com, social presence can be felt by highlights of the most helpful favorite or critical review, an indication of X out of Y users found this review helpful, reviewer profiles and their past contributions in the community, acknowledgment of a reviewer with a badge (e.g., Top Reviewers) and allowing consumers to rate the review. Although

these system features may allow consumers to read reviews in a more organized way, know more about reviewers and evaluate reviews more effectively, they may not help consumers better know a product. It implies that these IT-based information cues could be important for users in terms of overall experiences of using the website, but they are not the key aspects for consumers to consider when it comes to evaluate the product and being influenced by enhancing their knowledge about the product.

#### 4.7.2 The Formation of Value-expressive Influence

Consistent with the hypotheses, development of value-expressive influence is affected by review quality, review consistency and social presence. Value-expressive influence represents the extent to which a consumer tends to be like others to enhance his self-concept. According to the Social Comparison Theory (Festinger 1954), when objective and non-social means are not available, people tend to form their opinions by comparing and seeking others' subjective opinions from the social environment. The model confirms that consumers utilize multiple information cues to know others' overall attitudes toward a product and identify with others, ultimately developing value-expressive influence.

First, when reviews are of high-quality, consumers are able to have a better view of the product. Based on SIT, high-quality reviews make the identification process more easy as they clearly describe product features and allow consumers to match their needs with the product based on reviews. Moreover, reading high-quality reviews helps consumers to identify themselves with those reviewers who wrote these reviews, as high quality increases the trustworthiness of reviewers. Thus, consumers tend to be like those reviews, leading to value-expressive influence.

Second, when reviewers express similar opinions of liking or disliking a product, consumers consider their opinions as a group opinion and use this group opinion as a social anchorage of behavior. Consumers would be able to form their own opinions of the product more easily. As a result, a high consistency of user reviews facilitates consumers' identification process by helping them to decide if they want to follow or be like others. Consequently, value-expressive influence is likely to occur.

Third, as discussed above, social presence is reflected and felt by a couple of system features when reading reviews. High social presence facilitates developing trust among strangers in the virtual world. Hence, it helps consumers to understand and evaluate a product effectively from different perspectives. With multiple information cues, consumers are able to identify themselves with reviewers whom consumers can trust and know more about and are more willing to follow. In this regard, higher social presence leads to stronger value-expressive influence.

#### 4.7.3 The Impacts of Social Influence on Perceived Decision Quality

It is interesting to find out that social influence has limited impact on consumers' confidence in making purchase decisions. That is, informational influence is marginally associated with perceived decision quality, while value-expressive influence is not associated.

When consumers are influenced by reviewers as a result of knowledge acquisition, they would have a better understanding of the product and know if the product meets their expectations. By taking these evaluations into account, consumers are able to make a confident purchase decision.

Although significant, consumers get marginal influence from external knowledge to make their purchase decisions. There are a couple of possible explanations. First, in this research, the product selected is a digital camera. As digital cameras are search products, product specifications such as color, weight, pixels, and optical zoom are very important dimensions for consumers to consider. These technical details are factual-based information, which are typically provided on the website. In this sense, consumers do not need to rely on experience-based user reviews to make their judgments. Thus, informational influence from others' opinions is not the dominant factor in increasing consumers' confidence in making purchase decisions. Second, in this controlled lab environment, participants were asked to make a purchase decision on a single digital camera based on user reviews. It may be that participants would feel more confident if they were given multiple cameras to compare before making the decisions.

Value-expressive influence was found to have no significant impact on perceived decision quality. This implies that although consumers tend to identify themselves with a group of people and would like to be like others, they do not necessarily feel confident in decision-making. Consumers' confidence does not simply come from being like others without knowing anything. When it comes to a purchase decision, consumers will take it seriously after they internalize information into their own knowledge from a variety of sources and make a well-informed decision.

#### 4.7.4 The Impacts of Social Influence on Perceived Usefulness

The model confirms that both informational and value-expressive influences are positively related to perceived usefulness of the website in making a purchase decision. When consumers receive informational influence that helps to have a better

understanding of a product, they would perceive that the website does a good job in providing and managing user reviews and reviewers to facilitate the decision-making process. In addition, when consumers are able to identify themselves with a group of reviewers to develop value-expressive influence, they would perceive that the website increases the efficiency and effectiveness of a purchase decision by providing a platform to know others' attitudes and making a group-based decision. Meanwhile, when consumers feel confident in their purchase decisions, they would perceive the website to be valuable by appreciating all the system features implemented in user reviews.

#### 4.7.5 The Moderating Effect of Prior Product Expertise

In the system-generated recommendation systems, products are recommended to consumers based on consumers' preference and a certain type of algorithm. Researchers have shown that novice consumers are more likely to rely on the systems to make purchase decisions, as the system increases their confidence and satisfaction in the decision-making process (Xiao and Benbasat 2007).

In this research context, products are recommended to consumers based on others' real experiences of using them. The results indicate that there are no significant differences between knowledgeable and less knowledgeable consumers in relying on others' opinions to develop informational influence. One possible explanation is that prior product expertise and user reviews are complementary to help consumers evaluate the product. To some extent, prior product expertise may reflect an individual's knowledge related to the technical specifications of the product (e.g., pixels, lens, etc.). On the other hand, user reviews are mostly about personal experiences of the product, so user reviews are more case-by-case customized knowledge. Considering that customized

experience-based knowledge could help consumers better understand the product performance from various perspectives, consumers, even for knowledgeable consumers, are open to others' opinions and willing to internalize their opinions into their own knowledge.

#### 4.7.6 The Moderating Effect of Self-monitoring

This study also tested the moderating role of self-monitoring and found no significant moderation.

Self-monitoring captures an individual's sensitivity to others' attitudes and opinions by tailoring his actions in accordance with socially desirable behaviors. Typically, an individual's self-monitoring is measured by his responses to others through face-to-face interactions and observations of facial expression, motives and emotions. The scenario changes when self-monitoring is used to predict online consumer behaviors. First, there are few personal interactions between consumers and reviewers. The interaction is mostly limited to the writing-reading relationship. Even with the help of a variety of system features as mentioned earlier to know reviewers, consumers are not familiar with reviewers as much as in the offline setting. As a result, sensitivity to reviewers' attitudes may be difficult to form and detect based on currently available IT artifacts. Second, it is reasonable to argue that sensitivity in the real world may not carry over into the virtual world. For example, in the virtual world especially when a virtual community is made up of strangers, more efforts are needed to build trust and sense of belonging among strangers than in the face-to-face context. Depending on the system features or mechanisms through which a community is managed, an individual could behave differently from his offline setting, becoming more or less sensitive to others'

actions and tailor his behavior accordingly. Therefore, the role of this construct may indeed be different in an online context.

#### 4.7.7 Managerial Implications for Commercial Websites

This study provides useful insights on product promotion for commercial websites and product development for manufacturers. Both websites and manufacturers need to realize the importance of user reviews in consumer decision making. By understanding social influence from user reviews, the primary goal is to maximize the business value of user reviews and leverage their potential social influence to provide competitive better products and services to consumers, ultimately increasing sales and customer loyalty.

Given that review quality plays a critical role in developing informational and value-expressive influence, the website needs to think about how to motivate reviewers to post high-quality reviews. The website could increase the visibility of reviewers in the community or give discount to those reviewers whose reviews are helpful to consumers. These incentive mechanisms could enhance reviewers' loyalty and sense of belonging to the website, thus encouraging more active involvements in the review activities. In addition to expectation from reviewers' valuable contribution, the website could implement quality control mechanisms to ensure the review quality after a review is posted. For example, the website could introduce a moderator to centrally manage reviews.

As the model indicates that review consistency is positively related to value-expressive influence. When reviews are not consistent, consumers are very likely being confused with what opinions they can take or not. In this case, the social influence from user reviews will be limited. Hence, to minimize the confusion, the website might

introduce an expert/professional reviewer. This may clear some of the concerns raised by consumers in the presence of inconsistent reviews.

The website should improve system design so that it can leverage IT artifacts to increase the exposure of reviewers to consumers and facilitate trust building among both parties. With a closer relationship, reviews could be more valuable and appreciated by consumers. Consequently, reviewers could be more influential to consumers.

Last but not least, since user reviews do help to form strong social influence, it is necessary for the websites to think about how to encourage consumers to post reviews after purchase. Amazon.com sends an email to consumers for product reviews in about two weeks after purchase. As providing reviews is purely voluntary, there is no guarantee that consumers will do so. To encourage more reviews to be posted, the website may set up incentives to consumers such as free 2-day shipping for the next purchase and adding additional points in the user account for redemption. The website could also manage the system to make posting reviews easier and efficient. By linking user reviews with consumers' purchase benefits and improving usage experiences, the website could expect more reviews from consumers.

#### 4.7.8 Managerial Implications for Manufacturers

Given the potential influence of user reviews, manufacturers may consider user reviews as a superior information platform to have a better idea about how consumers think about their products. User reviews can help manufacturers know how to improve the product and address potential problems in terms of functionality, aesthetic design, etc. to adapt to consumers' changing needs and maintain their market share in such a turbulent business world. User reviews can also be used as a marketing tool to launch



product campaigns, as they are perceived as more influential and persuasive than marketer-generated ads or editorial reviews. For example, a banner could be placed online or in TV ads, stating that the average rating of product X is 4.5 star and ranks Top 10 of best selling in its category.

#### 4.7.9 Theoretical Contributions

This study contributes to the IS research in the following ways. First, SIT has been applied to the IS field to understand how social influence affects system adoption and usage. In this research stream, sources of social influence mainly come 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 mechanism under which consumers are influenced by others.

Second, to explore the development of social influence from user reviews, this is one of the first IS studies that recognizes and differentiates types of social influence and examines their antecedents and impacts. By doing so, this study advances our knowledge about the different mechanisms through which social influence is developed.

Third, this study also incorporates individual characteristics as moderators to better understand the formation of two types of social influence. Although there is lack of evidence to prove the moderating effects, it generates a couple of interesting thoughts as discussed in the previous section.

Last but not least, this is one of the few IS studies that empirically validated the measurement items for two types of social influence and for self-monitoring in the online setting. The scales for these constructs have been receiving heated debate and validation

in the sociology and marketing literature, but are less understood in the IS literature, in particular in the context of E-commerce. We hope that this study will motivate IS researchers to continue investigating these issues.

#### 4.7.10 Limitations and Future Research

There are several limitations worthy of further investigation. First, as the unit of analysis is the individual product, participants were asked to evaluate the product based on their overall perceptions on a set of user reviews, NOT perceptions on individual reviews. One potential area of future research could be to explore how individual reviews affect consumers differently. Second, as we used the digital camera to validate the model, we did not discuss how social influence varies across product categories. Future studies should extend the research scope to include more products from a variety of categories. It is reasonable to expect that social influence and consumer decision-making will be different in the case of search vs. experience products, ordinary product vs. fashion/luxury products. 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. Last but not least, since self-monitoring was not significant in moderating the formation of social influence from user reviews, we call for additional research to establish the applicability of self-monitoring in online settings

#### 4.8 Concluding Remarks

This study investigates an emerging research topic on the value of user reviews in E-commerce. The model indicates that user reviews can form strong social influence that impacts consumers' decision-making when they make purchase decisions. The

development of informational influence is positively affected by review quality, while the development of value-expressive influence is positively affected by review quality, review consistency and social presence. The social influence from user reviews strengthens consumers' confidence in decision-making and perceived usefulness of the system performances. In essence, this study highlights the business value of user reviews and sheds light on how commercial websites and manufacturers can improve system design to manage and leverage user reviews to offer better products and services to consumers.

## CHAPTER 5: CONCLUDING REMARKS

Given the special features of VCs: user-generated contents, IT-enabled interaction and voluntary participation, this dissertation empirically investigates the impact of user-generated contents and system performance on user continued participation in VCs and their influence on consumer decision making. Study 1 reveals that high information and system quality increase users' individual benefits, ultimately motivating users to continue using an information-exchange VC. As an extension of Study 1, Study 2 further argues that users could be motivated to behave differently by various individual benefits and their past behaviors. It is important for VCs to set up incentives that are specific to a particular group of users to encourage their participation. Study 3 examines how user-generated product reviews and their related system features form social influence that impact consumer purchase decisions. This study shows the value of user reviews to consumers, commercial websites and manufacturers.

This dissertation enhances our understanding of how information systems play a role in user participation and consumer decision making in VCs. It provides both academia and practitioners many useful insights on VC design and management.

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## APPENDIX A: SURVEY ITEMS USED IN STUDY 1 &amp; STUDY 2

(5-point Likert scale: 1-strongly disagree, 5-strongly agree)

Perceived Information Quality	
<ul style="list-style-type: none"> <li>• Reliability</li> </ul> Information is trustworthy. Information is not reliable. (R) <sup>8</sup> Information is free of errors. Information comes from reputable sources.	<ul style="list-style-type: none"> <li>• Richness (Formative)</li> </ul> Information is not sufficient enough for my needs. (R) Information contains a wide range of topics/subjects. Information is in-depth for a given topic.
<ul style="list-style-type: none"> <li>• Objectivity</li> </ul> Information is biased. (R) Information presents an impartial view.	<ul style="list-style-type: none"> <li>• Format</li> </ul> Information is clear in meaning. Information is difficult to read. (R) Information is presented in a consistent form. Information is formatted concisely.
<ul style="list-style-type: none"> <li>• Relevancy</li> </ul> Information is informative for my needs. Information is valuable for my needs.	<ul style="list-style-type: none"> <li>• Timeliness</li> </ul> Information is current. Information is out-of-date. (R)
Perceived System Quality	
<ul style="list-style-type: none"> <li>• Navigation</li> </ul> XXX provides tools for me to easily locate information (e.g., table of contents, use of categories, and index). The descriptions for each link are clear. The navigation aids are effective. We can control how to access information. We can control how fast to go through XXX.	<ul style="list-style-type: none"> <li>• Security</li> </ul> XXX protects information against unauthorized access. XXX protects my personal information. We feel safe to participate in XXX.
<ul style="list-style-type: none"> <li>• Accessibility</li> </ul> All elements load quickly (text, graphics, etc). All loadable elements are visible. The search engines are not powerful. (R)	<ul style="list-style-type: none"> <li>• Interactivity (formative)</li> </ul> XXX allows me to interact with other users by various methods (e.g., discussion board, email, blog). XXX allows me to know more about other users and their participation (e.g., a user profile, tenure on the group, number of postings, etc). XXX allows me to get feedback from and give feedback to others regarding the quality of messages (e.g., message rating).
<ul style="list-style-type: none"> <li>• Appearance</li> </ul> The structure of information presentation is logical. XXX has visually attractive screen layout.	

<sup>8</sup> R: reverse-coded item

The layout across XXX is not uniform. (R)		
Perceived Individual Benefits		
<ul style="list-style-type: none"> <li>• Information Benefits</li> </ul> <p>I find useful information that We need most I get valuable answers from others to my queries. I find information that is not available somewhere else.</p>	<ul style="list-style-type: none"> <li>• Visibility Benefits</li> </ul> <p>Posting messages provides me a chance to show-off. Posting messages increases my reputation in XXX.</p>	
<ul style="list-style-type: none"> <li>• Social Benefits</li> </ul> <p>I enjoy the experience of learning from others. XXX helps me refine my thinking and being inspired by new ideas. I get social support from interacting with other users and receiving feedback.</p>	<ul style="list-style-type: none"> <li>• Altruistic Benefits</li> </ul> <p>I enjoy helping others by answering questions posted by other users. I am happy that my messages will be valuable to other users. Being able to share makes me feel happy.</p>	
User Satisfaction		
<p>I'm very satisfied with the overall experience of using XXX. I'm very pleased with the overall experience of using XXX. I'm very delighted with the overall experience of using XXX.</p>		
Continuance Intention to Participate		
<ul style="list-style-type: none"> <li>• Continuance Intention to Consume Information</li> </ul> <p>I intend to continue browsing information in XXX. I intend to continue seeking for information We want. I intend to continue posting questions in order to seek for help.</p>	<ul style="list-style-type: none"> <li>• Continuance Intention to Provide Information</li> </ul> <p>I intend to continue posting messages in reply to other messages. I intend to continue initiating topic discussions. I intend to continue participating in discussions.</p>	
Demographics		
<p>1. Gender      A. Male    B. Female 2. Age          A. 18-30   B. 31-40   C. 41-60   D. &gt;60 3. What is the highest level of education you have completed? A. High school or equivalent B. Vocational/technical school (2 year) C. Some College D. Bachelor's degree E. Master's or higher degree F. Other (please specify): _____ 4. Are you a registered user or non-registered user? A. Registered   B. Non-registered 5. How many months have you been using XXX (either as a reader or poster)? A. This is my first time.   B. &lt; 6 months    C. &lt; 1 year    D. 1-2 years E. 2-5 years      F. &gt; 5 years</p>		

6. On average, how many hours per week do you spend on **XXX** (reading or posting)?  
A. <5 hrs    B. 5-10 hrs    C. 10-20hrs    D. > 20hrs
7. What is the average number of questions you post for help per month?  
A. I read, do not post    B. 1-10    C. 11-20    D. > 20
8. What is the average number of posts you contribute for discussion per month?  
A. I read, do not post    B. 1-10    C. 11-20    D. >20
9. Please share any additional comments you may have regarding your experiences with **XXX**.

## APPENDIX B: SURVEY ITEMS USED IN STUDY 3

(5-point Likert scale: 1-strongly disagree, 5-strongly agree)

Demographics	
<ul style="list-style-type: none"> <li>• Gender: A. Male B. Female</li> <li>• Age: A. 18-30 B. 31-40 C. 41-60 D. &gt;60</li> <li>• What is the highest level of education you have completed? A. High school or equivalent B. Vocational/technical school (2 year) C. Some College D. Bachelor's degree E. Master's or higher degree F. Others</li> <li>• Have you purchased a digital camera recently? A. Yes B. No               <ul style="list-style-type: none"> <li>▪ If not, are you interested in buying a digital camera in the near future? A. Yes B. No</li> </ul> </li> <li>• Are you interested in photography? A. Yes B. No</li> </ul>	
Review Quality	
<ul style="list-style-type: none"> <li>• Adequacy Adeq1: User reviews are adequate. (not applicable: Information contains a wide range of topics/subjects.) Adeq2: The amount of information in the reviews matches my needs. Adeq3: User reviews are sufficient enough for my needs. (R)</li> </ul>	
<ul style="list-style-type: none"> <li>• Depth Dept1: User reviews are in-depth for a given product. Dept2: User reviews provide me with comprehensive information. Dept3: User reviews provide me with all detailed information We need.</li> </ul>	
<ul style="list-style-type: none"> <li>• Reliability Reli1: User reviews are trustworthy. Reli2: User reviews are reliable. Reli3: User reviews are credible. Reli4: User reviews come from reputable sources.</li> </ul>	
<ul style="list-style-type: none"> <li>• Relevancy Rele1: User reviews are informative for my needs. Rele2: User reviews are valuable for my needs. Rele3: User reviews are relevant to my needs.</li> </ul>	
<ul style="list-style-type: none"> <li>• Objectivity Obj1: User review is biased. (R) Obj2: User review presents an impartial view. Obj3: User review is based on facts.</li> </ul>	
<ul style="list-style-type: none"> <li>• Recency Rece1: User reviews are sufficiently timely. Rece2: User reviews are out-of-date. Rece3: User reviews are recent.</li> </ul>	
<ul style="list-style-type: none"> <li>• Understandability Unde1: User reviews are clear in meaning.</li> </ul>	

<p>Unde2: User reviews are easy to read. Unde3: User reviews are understandable.</p>
<ul style="list-style-type: none"> <li>• Conciseness</li> </ul> <p>Conc1: User reviews are formatted compactly. Conc2: User reviews are presented concisely. Conc3: User reviews are presented in a compact form.</p>
<p>Review Consistency</p>
<p>RC1: Reviews are consistent. RC2: Reviewers' opinions are similar. RC3: Reviews are not contradictory.</p>
<p>Social Presence</p>
<p>SP1: There is a sense of human contact in the website. SP2: There is a sense of personalness in the website. SP3: There is a sense of sociability in the website. SP4: There is a sense of human warmth in the website. SP5: There is a sense of human sensitivity in the website.</p>
<p>Informational Influence</p>
<p>II1: My purchase decision has been influenced by reviews We have read. II2: My observation of what reviewers think of influenced my purchase decision. II3: To make sure We buy the right product, We have observed what reviewers think of the product. II4: I obtained information from reviewers before making my purchase decision.</p>
<p>Value-expressive Influence</p>
<p>VI1: I feel that those reviewers possess the characteristics which I would like to have. VI2: I feel that it would be nice to be like those reviewers. VI3: I feel that those reviewers are admired or respected by others. VI4: It is important that the reviewers have the same feeling about the product as I do. VI5: I have achieved a sense of belonging by following reviewers' recommendations. VI6: I have followed the reviewers' recommendations because I want to be like them. VI7: I am willing to identify with reviewers by making the purchase decision based on their recommendations.</p>
<p>Decision Quality</p>
<p>DQ1: I am confident that my purchase decision suits my needs. DQ2: I am confident that my purchase decision matches my preferences. DQ3: I would make the same purchase decision if I had to make the decision again. DQ4: This is clearly the right purchase decision for my needs.</p>
<p>Perceived Usefulness</p>
<p>PQ1: PU1: The website is useful in shopping for XXX. PU2: The website improves my performance in shopping for XXX. PU3: The website enables me to shopping for XXX. PU4: The website enhances my effectiveness in XXX shopping. PU5: The website makes it easier to shop for XXX. PU6: The website increases my productivity in shopping for XXX.</p>
<p>Product Expertise</p>
<p>PE1: I'm knowledgeable about the product. PE2: I'm experienced with the product.</p>

<p>PE3: I'm competent with the product.</p> <p>PE4: I'm familiar with the product.</p> <p>PE5: I'm an expert in XXX.</p> <p>PE6: I understand the features of the product well enough to evaluate.</p>
<p>Self-monitoring</p>
<ul style="list-style-type: none"> <li>• Ability to modify self-presentation</li> </ul> <p>SMSP1: In social situations, I have the ability to alter my behavior if I feel that something else is called for.</p> <p>SMSP2: I have the ability to control the way I come across to people, depending on the impression I wish to give them.</p> <p>SMSP3: When I feel that the image I am portraying isn't working, I can readily change it to something that does.</p> <p>SMSP4: I have trouble changing my behavior to suit different people and different situations.</p> <p>SMSP5: I have found that I can adjust my behavior to meet the requirements of any situation in which I find myself.</p> <p>SMSP6: Even when it might be to my advantage, I have difficulty putting up a good front.</p> <p>SMSP7: Once I know what a situation calls for, it's easy for me to regulate my actions accordingly.</p>
<ul style="list-style-type: none"> <li>• Sensitivity to expressive behavior of others</li> </ul> <p>SMEB1: I am often able to read people's true emotions correctly (through their eyes).</p> <p>SMEB2: In conversations, I am sensitive to even the slightest change in the facial expression of the person with whom I am conversing.</p> <p>SMEB3: My powers of intuition are quite good when it comes to understanding the emotions and motives of others.</p> <p>SMEB4: I can usually tell when others consider a joke to be in bad taste, even though they may laugh convincingly.</p> <p>SMEB5: I can usually tell when I've said something inappropriate by reading it in the listener's eyes.</p> <p>SMEB6: If someone is lying to me, I usually know it at once from that person's manner of expression.</p>
<p>Control Variables</p>
<ul style="list-style-type: none"> <li>• Approximately how many reviews have you read? A. &lt;5            B. 6-10            C. 11-20            D. 21-30            E. &gt;30</li> <li>• Approximately how many minutes did you spend on reading reviews? A. &lt;1 minute    B. 1-3 minutes    C. 4-5 minutes    D. 6-10 minutes</li> <li>• When you were reading reviews, what kind of reviews have you read? A. Positive reviews only    B. Negative reviews only    C. Both</li> <li>• How influential to your purchase decision were the following types of reviews? (1-5) A. Negative: Negative reviews    B. Positive: Positive reviews</li> <li>• In general, please indicate the importance of the following aspects of user reviews in determining your purchase decision on a digital camera. (1-5) A. Rating: Average star rating    B. Total: Total number of reviews C. Profile: Availability of reviewers' profile</li> </ul>

D. Expert: Expertness of the reviewers

- Familiarity with the website: “I am familiar with user reviews on Amazon.com” (1-5)
- Frequency of visits: “I visit Amazon.com for reading user reviews regularly when I need to make a purchase decision” (1-5)
- Are you familiar with the brand of the camera?
- Please share any additional comments you may have regarding your experiences with user reviews on Amazon.com



## APPENDIX C: RECRUITMENT SCRIPT USED IN STUDY 3

Dear student,

Our research team in the BISOM department is conducting a research entitled *The Sources and Impacts of Social Influence in Virtual Communities for Product Recommendation*. The project is being conducted by Professors Stylianou, Zhao, and Zheng.

You are invited to participate in a survey in a controlled lab environment. It will take about 20-25 minutes to complete. 20 participants will receive a \$20 Amazon gift cards from a random raffle drawing.

Of course, participation is entirely voluntary. If you are willing to participate, please remain seated. We will start in just a few minutes. If you are not willing to participate, please feel free to leave the lab.

Thank you very much for your time and patience.

Dr Stylianou, Dr Zhao and Ms Zheng

BISOM Department, UNCC

January, 2011

## APPENDIX D: INSTRUCTIONS USED IN STUDY 3

Scenario: In this study, you need to use the user review system on Amazon.com in order to make a purchase decision for a digital camera and subsequently evaluate the system performance. The specific camera has been pre-assigned to each of you.

- Demonstration: See Appendix E
- Before you take the survey:

The instructor will turn on Camtasia and open the webpage named “User reviews (1, 2, 3, etc.)” on the desktop. Camtasia is a motion-recording software to record your browsing activities.

You will take up to 10 minutes to read user reviews for the camera that has been assigned to you. You can use all available Amazon features that have been demonstrated to read reviews.

In order to effectively evaluate user reviews and the product, please read user reviews until you feel that you have read enough to make the purchase decision. You may stop at any time within 10 minutes when you finish reading.

The instructor will remind you when 10 minutes is up for reading reviews.

- The survey: Based on the user reviews you have read, you will be asked to fill out an online survey. In the survey, you will evaluate your decision-making outcomes and user reviews based on what you have read. The survey will take about 5-10 minutes to complete.

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Procedures

- **Step 1:** Please read user reviews on the camera that has been pre-assigned to you. The webpage has been opened up for you on the computer screen.
- **Step 2:** Once you finish reading reviews within 10 minutes, raise your hand up, wait for the instructor to stop Camtasia and guide you to the online survey.

The instructor will also remind you when 10 minutes is up. You need to stop reading. Please wait for the instructor to stop Camtasia and guide you to the online survey.

- **Step 3:** Once you finish the survey, please leave the lab. **DO NOT** log off the computer.

Now, let's get started with step 1! Please start reading reviews.

## APPENDIX E: DEMONSTRATION SCRIPT USED IN STUDY 3

**Sample product:** TomTom XXL 540TM 5-Inch Widescreen Portable GPS Navigator

**Open the webpage** [http://www.amazon.com/TomTom-Widescreen-Portable-Navigator-Lifetime/product-reviews/B003B3P2CY/ref=dp\\_top\\_cm\\_cr\\_acr\\_txt?ie=UTF8&showViewpoints=1](http://www.amazon.com/TomTom-Widescreen-Portable-Navigator-Lifetime/product-reviews/B003B3P2CY/ref=dp_top_cm_cr_acr_txt?ie=UTF8&showViewpoints=1)

**Script:** We will use a Tom-Tom 5-inch GPS navigator as an example to demonstrate the system features of Amazon user reviews.

This webpage displays the user reviews on the GPS. At the top of the webpage, you will find the following information:

- The product name (TomTom XXL 540TM 5-Inch Widescreen Portable GPS Navigator)
- average customer rating (3.5/5)
- rating break-down by each star and by attribute
- total number of customer reviews (1052)
- the most helpful favorable review and the most helpful critical review

If you scroll down, you will find the detailed individual reviews. You can read by the most helpful or by the newest. If you want to read more reviews, click “Next” to open the second page of the reviews. You can also search reviews by keywords you specify right above the user reviews.

For each piece of review, take the first review as an example, in addition to star rating, the title of and contents of the review, you will also find

- who wrote the review (R. Pertusio)

- Amazon-acknowledged reviewer identity (real name, Amazon verified purchase)
- Helpful votes on the review (1156 of 1165 people found the following review helpful)
- If you place your mouse over the “Down” arrow next to the reviewer’s name, you will find a summary of the reviewer’s profile and past contributions. Click on the “Down” arrow or the reviewer’s name, a new page will be opened up for you that shows the details about the reviewer and his/her past contributions. Click the “Back” button to return to the page of user reviews you previously opened.

You can use all these features to read user reviews. If you want to know more about basic product information, click on the link right below “Customer Reviews” at the top to open the homepage of the product. Click “322 customer reviews” next to the star rating to return to the page of user reviews.

That’s all about the demonstration. Next, let’s move on to our survey procedures.