

## Building Community Citizenship Behaviors: The Relative Role of Attachment and Satisfaction

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### Abstract

*Members' voluntary and beneficial behaviors (i.e., citizenship behaviors) are central to the development and success of professional virtual communities (VCs). In this study, we identify two types of citizenship behaviors in VCs: those directed toward the VC and those directed toward individuals. We propose a theoretical model to examine whether VC attachment and satisfaction can have different effects on the two types of citizenship behaviors in VCs. Drawing on the "self-concept" as noted in marketing literature, we identify three needs to be fulfilled in order to establish the VC-self connection and model them as the antecedents of VC attachment and satisfaction. We empirically test the model with data collected from 196 users of a professional VC. The results indicate that VC attachment plays a more important role in explaining citizenship behaviors directed toward the VC and that satisfaction plays a more important role in explaining citizenship behaviors directed toward individuals. In addition, the three aspects of the self-concept are associated with members' VC attachment and satisfaction. We discuss the implications of our findings.*

**Keywords:** Virtual Community, Citizenship Behaviors, Self-Concept, Virtual Community Attachment, Satisfaction.

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# Building Community Citizenship Behaviors: The Relative Role of Attachment and Satisfaction

## 1. Introduction

Professional virtual communities (VCs) allow groups of people who share common interests, goals, or practices to interact on the Internet (Chiu, Hsu, & Wang, 2006) and are an innovative vehicle for sharing knowledge (Wasko, Faraj, & Teigland, 2004). Professional VCs include open source communities, VCs for programmers, and so on. Professional VCs that operate in an online environment are characterized by self-organization, technology-mediated communication, weak ties among members, and the absence of formal reward systems. Members must behave in a way that benefits the group as a whole if the community is to function effectively and efficiently (Yong, Sachau, & Lassiter, 2011). Such voluntary conduct is called virtual community citizenship behavior (VCCB). Given the fundamental role of citizenship behavior improves organizational performance (e.g., Podsakoff, MacKenzie, Moorman, & Fetter, 1990), we expect that citizenship behavior should also be central to the development and success of professional VCs (Xu, Li, & Shao, 2012). The natural question then is: how can citizenship behavior be promoted among virtual community members as they interact almost entirely on the Internet? To answer this question, we use Programmer Club<sup>1</sup> as the target professional VC.

Following Organ's (1988) definition of organizational citizenship behavior (OCB), we define VCCB as member's behaviors that are voluntary, not directly monetarily rewarded by a VC, and that—in aggregate—promote the VC's effective functioning. Following Williams and Anderson's (1991) conceptual scheme of OCB that emphasizes the behavioral beneficiary, we identify two types of VCCB: virtual community citizenship behavior directed toward the virtual community (VCCBC) and virtual community citizenship behavior directed toward individuals (VCCBI). VCCBC refers to citizenship behaviors that would benefit a VC in general, such as demonstrating concerns about its image and expressing loyalty toward it. VCCBI refers to citizenship behaviors that benefit individual VC members, such as helping other members solve their problems and showing courtesy toward other members.

The distinction between VCCBC and VCCBI is critical on both theoretical and practical grounds. Theoretically, such a distinction is important because each could have different antecedents or be affected differently by the same antecedents. For example, the effect of attachment to a VC could be stronger on VCCBC than on VCCBI. Practically, since the two types of VCCB may contribute to the effective functioning of a VC at different levels, VCs' hosts or managers should also be able to differentiate between them. VCCBI helps maintain the balance of knowledge exchange between members in a VC, which then contributes indirectly to the VC's effectiveness. By contrast, VCCBC may directly increase a VC's efficiency by reducing the need for spending scarce resources on functions that are purely for maintenance. Therefore, we classify VCCB into VCCBC and VCCBI to gain a better understanding of their causes and effects.

Unlike physical organizations, VCs are characterized by weak ties among members. According to social exchange theory and the norm of reciprocity, members who are more satisfied with participating and sharing knowledge in a VC will be more likely to return the favor by engaging in behaviors that benefit other members of the VC. Since VCCBI primarily involves helping other members, it should play a key role in maintaining the interactions between VC members. In fact, Jin, Zhou, Lee, and Cheung (2013) show that VC members who were more satisfied were more likely to help other members. However, as people are likely to perceive many VCs as satisfactory, satisfaction alone might not be strong enough to bring users back to a VC repeatedly or foster the users' identification with the VC and, thereby, motivate them to engage in VCCBC.

Attachment is a strong and lasting psychological and emotional relationship between an individual and the attached object; it can be manifested by affection, connection, and passion (Thomson, Macinnis, & Park, 2005). People tend to attach to few VCs if not just one. Mowday, Steers, and Porter

<sup>1</sup> Programmer Club is one of the largest IT-oriented VCs in Taiwan with a membership of more than 180,000 IS professionals. Programmer Club is dedicated to sharing knowledge about programming, databases, HTML/DHTML, Web servers, drivers, embedded systems, and operating systems.

(1979) suggest that strongly attached members should exhibit strong loyalty to the VC and contribute to its success in the form of VCCBC. Attachment to a VC (VC attachment) refers to the degree to which a member identifies with the VC to fulfill the member's self-definitional needs and establishes an emotional bond with the VC. Strongly attached members tend to perform behind the scenes to help maintain the VC (Butler, Sproull, Kiesler, & Kraut, 2007), promote desirable behaviors and shape other members' behaviors in ways consistent with community norms (Bateman, Gray, & Butler, 2011), and continue to participate in VC activities and recommend the VC to others (Lin, 2010).

Although members' VC attachment and satisfaction are both crucial to a VC's success, their respective importance in the fostering of VCCBC and VCCBI could be different. Satisfaction is an individual-based construct that reflects the positive emotional state resulting from the individual's appraisal of the knowledge-sharing experience. Knowledge sharing, a reciprocal helping behavior, fosters a strong personal desire in the VC members to stay in the relationships that generate such satisfaction and, thereby, motivates their VCCBI. Satisfaction may lead to a sense of oneness with a VC (i.e., a VC-self connection). (Note that satisfaction itself is not the same as this sense of oneness or connection.) A sense of oneness with a VC induces individuals to take the VC's perspective and goals as their own and create a strong affection for, connection with, and passion toward the VC and, thus, an inclination to increase the VC's welfare. Without a strong sense of oneness with the VC, even satisfied members may still not be as strongly motivated to engage in VCCBC as they are to engage in VCCBI. Alternatively, organizational theorists suggest that identification with or attachment to an organization is the motive most closely related to OCB directed toward the organization (e.g., van Dick, Grojean, Christ, & Wieseke, 2006). In summary, VC attachment can elicit a sense of oneness with the VC, and individuals with a strong attachment to the VC should, therefore, be inclined to promote the VC's welfare as a whole by performing a high level of VCCBC. Therefore, we hold that VC attachment should be a more powerful than satisfaction as a driver of VCCBC. However, the relative importance of VC attachment and satisfaction in determining VCCBC and VCCBI, respectively, has received little research attention thus far.

Studies on VCs have suggested that members' VC attachment and satisfaction depend on community features (e.g., providing members with information about group activities) (Ren et al., 2012) or characteristics (information and system quality) (Lin, 2008). These studies, however, pay little attention to the importance of needs fulfillment in building member satisfaction and VC attachment. Researchers have found needs fulfillment to be a significant source of satisfaction (Oliver, 1995) and a driver of attachment (Park, MacInnis, & Priester, 2006). Although several studies have highlighted the importance of needs fulfillment to the sustainability of VCs (e.g., Yong et al., 2011), few, if any, consider whether VC members can have different types of needs and whether fulfillment of those needs leads to VC attachment and satisfaction. For example, Koh and Kim (2003) consider "enjoyability" as a type of needs fulfillment that increases members' sense of VC; it, however, should be just one of the needs that could be fulfilled by VCs. To fill this void, we investigate whether fulfilling VC members' self-definitional needs can enhance their attachment to and satisfaction with the VC, the two key aspects of a VC about which the VC's owner or operator should be most concerned.

Consequently, this study proposes two complementary paths for promoting VCCB: the conventional path from satisfaction to VCCBI and a new path from VC attachment to VCCBC. Thus, our model allows us to empirically examine whether VC attachment and satisfaction play different roles in explaining VCCBC and VCCBI. Although prior research has elaborated the impacts of self-definitional needs fulfillment on attachment (e.g., Park et al., 2006), we are aware of no study that has tested the underlying causal mechanism or empirically confirmed the impacts of self-definitional needs fulfillment on satisfaction. Based on survey data collected from 196 users of Programmer Club, our findings support the assertion that needs fulfillment is a crucial determinant of members' VC attachment and satisfaction, which, in turn, play different roles in shaping VCCBC and VCCBI. These findings yield important implications for research and practice.

This paper proceeds as follows. In Section 2, we discuss the conceptual foundation of the research and develops the research model. In Section 3, we explain the methods and analyze the data. In

Section 4, we discuss the results and their implications, the study's limitations, and suggestions for future research. Finally, in Section 5, we conclude the paper.

## 2. Conceptual Foundation and Research Model

### 2.1. Definition and Nature of VCCB

OCB is a voluntary behavior that is neither explicitly enforced nor required by a formal job contract. As we discuss in Section 1, we follow Organ (1988) to define VCCB, which we do for four reasons. First, beneficial behaviors in open professional VCs are at members' discretion. Second, no formally prescribed role requirements for members of professional VCs exist. Third, member contributions are not directly or explicitly recognized by formal reward systems since professional VCs usually do not have a formal reward system for rewarding contributions. Prior studies have suggested that individuals' participation in professional VCs is motivated by various informal rewards, such as obtaining useful information (Sutanto, Kankanhalli, & Tan, 2011), increasing one's sense of competence (Tsai & Pai, 2014), enhancing self-worth (Brock et al., 2005), and gaining a better reputation (Wasko & Faraj, 2005). Fourth, members' contributions are critical for the effective functioning and success of professional VCs.

### 2.2. Dimensions of VCCB

Although many ways to conceptualize OCB exist, the two most popular conceptualizations are those developed by Organ (1988) and Williams and Anderson (1991). Organ (1988) identifies five conceptual dimensions of OCB: 1) altruism (voluntary behaviors that help others with a work-related problem), 2) conscientiousness (voluntary actions beyond the minimum requirements of the organization), 3) sportsmanship (willingness to tolerate the inevitable inconveniences without complaining), 4) courtesy (actions aimed at preventing problems with others), and 5) civic virtue (responsible, constructive participation and involvement in the political process of an organization).

Williams and Anderson (1991) classify citizenship behaviors into two broad categories: 1) citizenship behaviors directed toward the benefits of other individuals (OCBI), such as altruism and courtesy; and 2) citizenship behaviors directed toward the benefits of the organization (OCBO), such as conscientiousness, civic virtue, and sportsmanship. Differentiating OCBO from OCBI is important because prior studies have shown that these two forms of OCB could have different antecedents. For example, Singh and Singh (2010) show the different effects of role overload and organizational support on OCBI and OCBO. Gilbert, Laschinger, & Leiter, (2010) indicate that empowerment and emotional exhaustion have different effects on OCBI and OCBO. Accordingly, we also maintain that VCCB should have different antecedents depending on the objects to which the behaviors are directed.

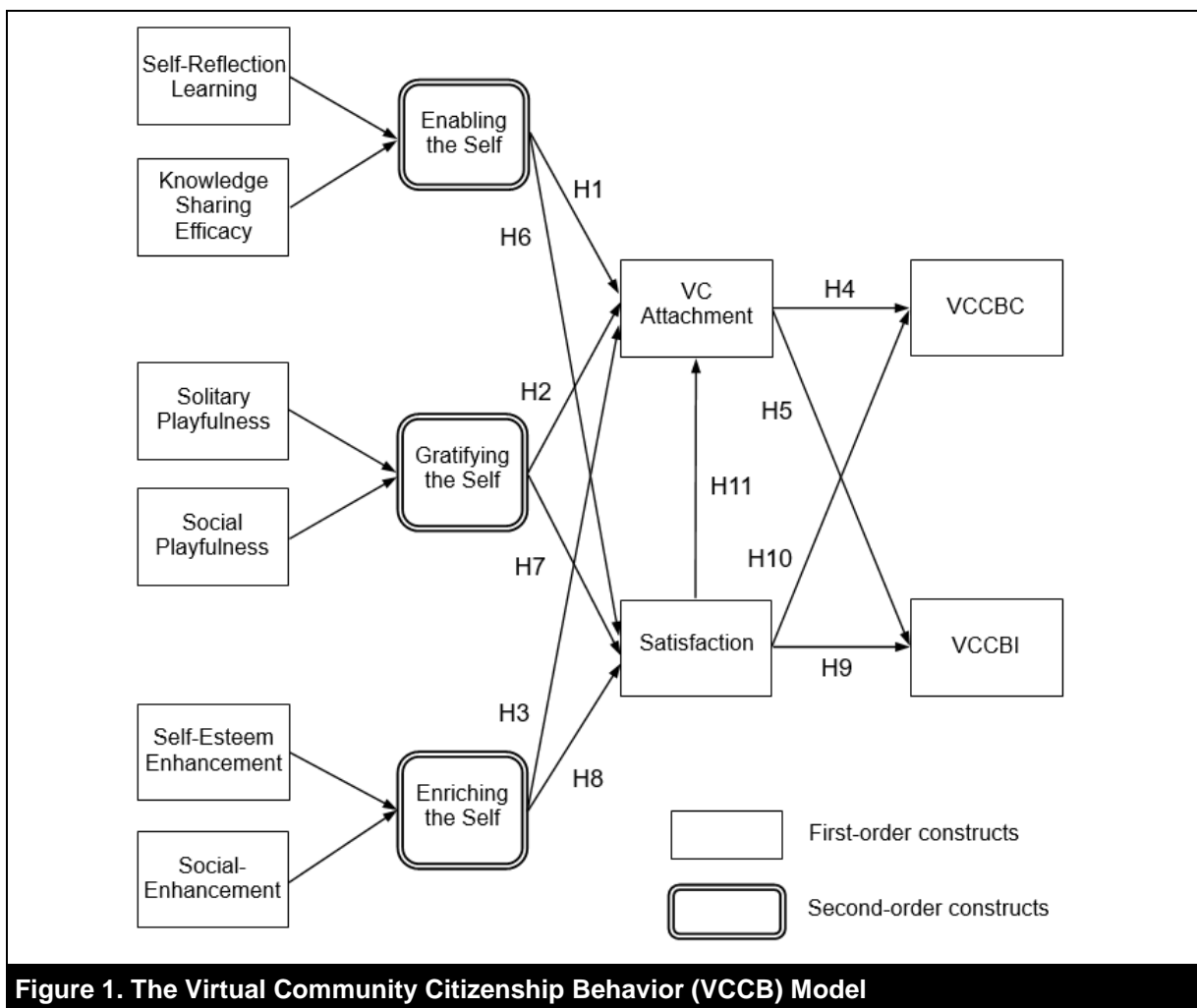
Although some studies have investigated the antecedents of VCCB, the findings in the extant literature are incomplete without examining VCCB based on the objects of the behavior. Some studies have treated VCCB as single-dimensional and referred to it as overall VCCB (e.g., Chen, Chen, & Farn, 2010; Ryoo & Kwak, 2011), resulting in a loss of information regarding the relative importance of antecedents in shaping VCCB that may benefit different objects. Other studies have measured VCCB from the perspective of VCCBI alone (e.g., Xu et al., 2012) and, thus, were unable to identify the antecedents for the two types of VCCB. Still other studies have treated the dimensions of VCCB as separate constructs and examined their relationships with the antecedents, which has led to a complex model without differentiation between VCCB beneficiaries (e.g., Yong et al., 2011).

We adopt Williams and Anderson's (1991) scheme to conceptualize VCCB with two distinct dimensions: VCCBI and VCCBC. VCCBC are behaviors directed toward benefiting a VC, while VCCBI behaviors benefit certain individuals in a VC. VCCBI, which conceptualizes reciprocal helping behaviors and courtesy, may contribute indirectly to a VC's effectiveness and, thus, contribute to its vitality and longevity. VCCBC, which conceptualizes allegiance to and promotion of a VC's interests, may directly increase a VC's performance and, thus, contribute to its development and sustainability. Members' constructive VCCBC behaviors, such as showing concern for the development of the VC

and a propensity for suggesting positive changes, allow the VC to devote fewer resources to preparing itself for the changing demands of current members and potential participants (Kim, Choi, & Han, 2004). Although not completely independent, VCCBI and VCCBC are sufficiently different to imply that individuals who engage in VCCBI do not necessarily engage in VCCBC. The VCCBI-VCCBC scheme permits us to examine VCCB activities that are directed toward distinct targets but ultimately contribute to the effectiveness of the VC. This scheme also allows us to differentiate the beneficiaries of the behavior, identify distinct sets of antecedents, and maintain a balance between model comprehensiveness and parsimony. By integrating attachment theory, social identity theory, and social exchange theory, we developed the research model depicted in Figure 1.

### 2.3. Virtual Community Attachment

Attachment is an emotion-laden, target-specific bond between a person and a specific object (Bowlby, 1979). Attachment theory provides a descriptive and explanatory framework for understanding interpersonal relationships. The theory was initially applied to explain the bonding between the infant and the mother and was then extended to adult romantic relationships, kinship, and friendships. According to Bowlby (1988), "the propensity to make strong emotional bonds to particular individuals [is] a basic component of human nature" (p. 3). Emotional bonds facilitate the development and maintenance of mental representations of the self and others or to the development and maintenance of internal working models, which guide the individual's feelings, thoughts, and expectations in later relationships (Bretherton & Munholland, 1999).





People, however, can form emotional attachments to a variety of objects, including another human being, a group, a material object, a virtual object, and so on. Bowlby (1979) suggests that the degree of emotional attachment to an object predicts the nature of an individual's interaction with that object. For example, individuals who are strongly attached to an object are more likely to be committed to, invest in, and make sacrifices for that object (Hazan & Shaver, 1994). Indeed, attachment has been extended beyond the person-to-person relationship to the person-to-brand context (e.g., Park, MacInnis, Priester, Eisingerich, & Iacobucci, 2010) and the person-to-VC context (e.g., Ren et al., 2012). Brand attachment reflects an individual's connection (a sense of oneness), affection (warm feelings), and passion (intense and aroused positive feelings) as they relate to a brand (Thomson et al., 2005). Analogously, VC attachment is individuals' connection with, affection for, and passion toward a VC. Thus, individuals with a strong attachment to a VC should be more likely to be committed to, invest in, and even make sacrifices for it, which should motivate them to perform pro-social actions that benefit the VC and others in the VC. For example, individuals who experience a strong attachment to a VC may be committed to keep the VC alive by actively contributing knowledge to it (Rodgers & Chen, 2005). Ren et al. (2012) also suggest that individuals may develop an attachment to a group in a VC, other VC members, and a VC as a whole. These feelings of attachment increase member participation, retention, and willingness to help the group and willingness to help individual members. Thus, attachment can explain good citizenship behaviors in purely voluntary environments such as virtual communities. However, our understanding of the causes and effects of VC attachment remains limited, which provides the motivation for the current study.

### **2.3.1. Self Concepts and VC Attachment**

Park et al. (2006) and Park, MacInnis, & Priester (2008) apply attachment theory to explain the relationship between consumers and brands. They define brand attachment as the strength of the cognitive and emotional bonds connecting the brand with the self. This connection denotes a linkage between a brand and an individual in such a way that the brand becomes an extension of the self when the brand fulfills the individual's functional, hedonic, and/or symbolic needs. That is, when those needs are fulfilled, the individual tends to regard the brand as personally meaningful and significant, and they further become personally connected and emotionally bonded to this brand (Park et al., 2006). Thus, the individual develops a sense of oneness with the brand through established cognitive and emotional links with it (Park et al., 2010). Brands are the mental representation of objects (Park et al., 2010). Therefore, one can apply the concept of brand-self connection to different objects. Recent studies on people's use of the VC (a virtual object) have used similar concepts to understand the dynamics of virtual communities, including the sense of virtual community (Blanchard, Askay, & Callas, 2010), sense of belonging (Zhao, Lu, Wang, Chau, & Zhang, 2012), and community identification (Hsu, Chiang, & Huang, 2012). Common among these concepts is a sense of oneness with the VC (the object) and the cognitive and emotional links that connect the VC with the self, similar to those of brand attachment. To make the exposition clearer and more direct, we apply the concept of brand attachment to the VC context and refer to such an attachment as VC attachment.

The motivation theory and related theories (e.g., self-determination theory) hold that needs-based motivations are the primary drivers of behaviors (Deci & Ryan, 1985). Some researchers suggest explaining people's use of a VC based on the needs satisfied through using the VC. For example, Sicilia and Palazón (2008) suggest that individuals' participation in a VC depends on the types of needs fulfillment that members perceive. They identify three types of needs fulfillment: functional, hedonic, and social. Because social needs fulfillment is largely symbolic, their classification of needs can be mapped to Park et al.'s (2006, 2008) key aspects of the self: enabling the self (functional), gratifying the self (hedonic), and enriching the self (symbolic) (see Table 1 for the definitions).

### **2.3.2. Solitary and Social Needs Fulfillment**

According to Ball-Rokeach, Rokeach, & Grube, (1984), individuals depend on media to meet certain needs. We can further conceptualize individuals' needs fulfillment regarding media use across two dimensions: self/solitary (personal needs fulfillment pertaining to the individual) and social (personal needs fulfillment dealing with society and others). Similarly, Dholakia, Bagozzi, and Klein (2004) also classify needs fulfillment into self- and group-referent. Consequently, we conceptualize each of Park et al.'s (2006, 2008) self-definitional needs fulfillment with two dimensions: solitary and social.

Key concepts regarding enabling the self are self-efficacy and the pursuit and achievement of mastery goals (see Table 1). Sutanto et al. (2011) propose that individuals often seek a virtual community to fulfill a core set of needs. Drawing on Dholakia et al. (2004), Sutanto et al. (2011) identified five types of needs fulfillment and examined their effects on sense of virtual community. They found that informational needs fulfillment is the most important driver of sense of virtual community. Informational needs fulfillment refers to obtaining useful information. In other words, an important motivation for individuals to participate in a VC is to fulfill the need to master information and knowledge. Sutanto et al. (2011) classify informational needs fulfillment as self-referent.

Self-reflection learning is a learning process that involves constructing an understanding, reframing the situation, and developing new knowledge and skills for problem-solving (Moon, 1999). Self-reflection learning is similar to informational needs fulfillment in the sense that it allows individuals to fulfill the need to master the knowledge and, thus, we model it as a solitary component of enabling the self.

Knowledge sharing efficacy refers to one's belief in one's ability to provide valuable or useful knowledge to other VC members (Kankanhalli, Tan, & Wei, 2005). Tsai and Pai (2014) indicate that competence has a significant effect on individuals' identification with VCs. When individuals find their knowledge is helpful to other VC members, a sense of competence develops, which enables those individuals' self. Knowledge sharing is a process of social interaction, and developing knowledge-sharing efficacy involves positive feedbacks from other VC members, and, thus, we model it as a social component of enabling the self (see Table 1).

A key concept of gratifying the self is sensory and aesthetic pleasure (see Table 1). DeFleur and Ball-Rokeach (1989) identify three dimensions of needs fulfillment in the context of media use, each of which has two sub-dimensions (solitary and social), which yields a total of six sub-dimensions. Two of the six sub-dimensions are solitary play (relaxing alone) and social play (relaxing in and through the company of others). Koh and Kim (2003) found that enjoyability is an important driver of sense of virtual community, with the enjoyability of a VC comprising enjoyment or playfulness derived from browsing the community's content (solitary playfulness) and interacting with other members (social playfulness). Accordingly, we model solitary playfulness and social playfulness as the two dimensions of gratifying the self (see Table 1).

The key concepts of enriching the self are the internally coherent self and the externally desired self (see Table 1). Self-esteem is inextricably linked to developing identity (Erikson, 1980), which represents a coherent and internally consistent sense of self (Dunkel, 2005). Individuals also can develop an externally (socially) desired self-image by gaining acceptance and approval from others, which enhances their social status in groups. Accordingly, individuals can participate in group activities because they need to enrich themselves through a boost in self-esteem (Tajfel & Turner, 1986) as well as social enhancement (Dholakia et al., 2004). Therefore, we propose that individuals wish to fulfill two basic needs in regards to self-enrichment: self-esteem enhancement and social enhancement. Self-esteem enhancement refers to maintaining and enhancing positive self-views (Sedikides & Alicke, 2012), while social enhancement refers to gaining the acceptance and approval of other members, and enhancing one's social status in a VC (Dholakia et al., 2004).

**Table 1. Types of Needs Fulfillment and Their Definitions and Related Components**

Types of needs fulfillment	Definition	Components in our research model	Similar concepts in VC studies
Enabling the self (functional needs fulfillment)	Enabling a sense of self-efficacy and allowing the pursuit and achievement of mastery goals	Self-reflection learning	<ul style="list-style-type: none"> <li>• Informational needs fulfillment (Dholakia et al., 2004; Sutanto et al. 2011)</li> <li>• Learning (Sun, Fang, &amp; Lim, 2012)</li> </ul>
		Knowledge sharing efficacy	<ul style="list-style-type: none"> <li>• Knowledge self-efficacy (Kankanhalli et al., 2005)</li> <li>• Competence (Tsai &amp; Pai, 2014)</li> </ul>
Gratifying the self (hedonic needs fulfillment)	Providing sensory and aesthetic pleasure	Solitary playfulness	<ul style="list-style-type: none"> <li>• Enjoyability of content browsing (Koh &amp; Kim, 2003)</li> </ul>
		Social playfulness	<ul style="list-style-type: none"> <li>• Enjoyability of social interaction (Koh &amp; Kim, 2003)</li> </ul>
Enriching the self (symbolic needs fulfillment)	Representing internally one's coherent self and expressing externally one's current or desired self	Self-esteem enhancement	<ul style="list-style-type: none"> <li>• Sense of self-worth (Bock, Zmud, Kim, &amp; Lee, 2005)</li> <li>• Self-enhancement (Yu, Jiang, &amp; Chan, 2011)</li> </ul>
		Social enhancement	<ul style="list-style-type: none"> <li>• Social enhancement (Dholakia et al., 2004; Sutanto et al. 2011)</li> <li>• Reputation (Wasko &amp; Faraj, 2005; Wasko et al., 2004)</li> </ul>

### 2.3.3. Enabling the Self and VC Attachment

In this study, enabling the self refers to the extent to which knowledge-sharing activities enhance one's knowledge sharing efficacy and allow one to pursue and achieve their mastery goals. According to attachment theory, a human infant develops an attachment to its mother based on the mother's responsiveness to its needs (Park et al., 2006). Similarly, individuals develop an attachment to a VC that they can trust to fulfill their functional needs (i.e., enabling the self). Garcia-Prieto and Scherer (2006) suggest that, when a group or community can enhance an individual's well-being by fulfilling the individual's needs, the individual will develop positive emotions toward the group. Individuals initially participate in a VC to develop new knowledge and skills to solve problems. A VC's ability to fulfill such functional needs appears to strongly affect members' sense of community (Sutanto et al., 2011).

Sluss, Ployhart, Cobb, and Ashforth (2012) propose that an individual's relational identification with other coworkers (e.g., supervisors) increases the individual's positive affect toward the organization via affect transfer, which, in turn, increases the individual's propensity to identify with the organization. Analogously, an individual who can fulfill the functional needs of mastering and sharing knowledge efficaciously through interacting with other VC members should also generate a relational identification with them. The interpersonal emotional bond eventually increases the individual's VC attachment via affect transfer. Blanchard and Markus (2004) also argue that one source of VC attachment is fulfilling the need for functional rewards from participation, such as knowledge growth through reflective learning. Accordingly, we theorize that members become attached to a VC when the knowledge sharing activities create a sense of a more capable self and help in achieving functional goals:



**H1:** *Enabling the self has a positive effect on VC attachment.*

#### **2.3.4. Gratifying the Self and VC Attachment**

In this study, gratifying the self refers to the extent to which hedonic elements of knowledge sharing activities evoke gratification for the self. Bowlby (1951) suggests that enjoyment is a major factor leading to attachment in intimate relationships. Maintaining interpersonal connectivity and obtaining hedonic pleasures are the important needs that individuals want to fulfill through participating in online communities (Dholakia et al., 2004). Such fulfillments can bring positive affects, gratification, favorable feelings about the community, and, thereby, attachment to the community. Needs-supply fit occurs when an organization fulfills an employee's needs (Caplan, 1987). Meyer and Allen (1991) indicate that emotional attachment to or identification with an organization results when work experiences fulfill the person's needs. Thus, when knowledge-sharing experiences constitute supplies or rewards (e.g., solitary playfulness and social playfulness) that create a needs-supply fit, VC attachment should result. Needs-supply fit gives a strong message that the VC is of high worth, which can lead a member to a sense of belonging to the VC (Koh & Kim, 2003). Supporting this view, prior studies have likewise confirmed that members whose hedonic needs are met by interacting with other members or the community content are likely to become attached to that VC (Koh & Kim, 2003). Support for the relationship between gratifying the self and emotional attachment was also provided by Vlachos, Theotokis, Pramataris, and Vrechopoulos (2010). Accordingly, we propose the following hypothesis:

**H2:** *Gratifying the self has a positive effect on VC attachment.*

### **2.4. Social Identity and VC Attachment**

Tajfel (1972) defines social identity as "the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership" (p. 292). Thus, social identity is also an emotional attachment to a group and knowledge of the social standing of the group in relation to other groups (i.e., its status) (Hogg, 2003). Accordingly, people tend to classify themselves in various social categories to facilitate self-definition or to define their self-concepts in their own social environment (Tajfel & Turner, 1986). According to Dutton et al. (1994), group identification or attachment occurs when an individual's self-concept is tied to the individual's group membership (Dutton, Dukerich, & Harquail, 1994). Accordingly, we adopt social identity theory as the theoretical foundation for investigating the relationship between enriching the self, attachment, and VCCB.

#### **2.4.1. Enriching the Self and VC Attachment**

Social identity theory holds that an enhanced positive feeling toward the self is a primary motivation for people to form social identities (Hogg, 1996), which implies that seeking self-esteem is a need whose fulfillment fosters social identification and group behavior (Abrams & Hogg, 1988). The functional approach to social identification suggests that people identify with groups to the extent that these groups help them fulfill their individual needs (Riketta, 2008). A group can grant the individual access to desired resources or enable need-fulfilling social relationships (e.g., Riketta, Van Dick, & Rousseau, 2006). Sharing knowledge to help other members solve their problems allows individuals to feel competent and worthy and to gain other members' acceptance and approval and, thereby, fulfill one's needs of maintaining a positive self-view and enhancing social status, respectively. Identification may occur as a by-product when these needs are fulfilled. Dholakia et al. (2004) posit that members attach to a VC to the extent that it fulfills important needs of the members, such as social enhancement. Once the needs for maintaining the positivity of an individual's self-esteem and social status within a VC are satisfied through knowledge-sharing activities in the VC, the individual will develop an emotional bond or identification with the VC and, thus, attach to the VC. Accordingly, we propose the following hypothesis:

**H3:** *Enriching the self has a positive effect on VC attachment.*

### 2.4.2. VC Attachment and VCCB

According to Mowday et al. (1979), individuals will have a strong desire to maintain membership in a community when they are attached to the community. Therefore, they are willing to perform citizenship behaviors to contribute to the well-being of the community as a whole. Van Knippenberg (2000) suggests that an individual's emotional bond to the group elicits a sense of oneness with the group, causing the individual to take the group's perspective and goals as the individual's own. This, in turn, motivates the individual to fulfill these goals by performing citizenship behaviors directed toward the group. Ren et al. (2012) suggest that attachment to a group within the community causes members to attend to and like the group, which, in turn, increases their willingness to exert effort to help the group. Accordingly, we propose the following hypothesis:

**H4:** *VC attachment has a positive effect on VCCBC.*

According to attachment theory (Bowlby, 1979), individuals are equipped with the care-giving behavioral systems through which they perform helping behaviors when their emotional bond to the group is strong enough to allow for an empathic focus on other members' needs (Mikulincer & Shaver, 2005). In other words, a strong emotional connection with the group facilitates helping behavior that is truly aimed at benefiting others even when there is no egoistic reason for helping (Mikulincer & Shaver, 2005). In this study, individuals' perception of needs fulfillment provides the basis for developing community attachment. Members in a VC may partially contribute to an individual's perception of needs fulfillment. Therefore, individuals may attribute their VC attachment indirectly to the members in the VC and then engage in VCCBI as a return favor to the members. Accordingly, we propose the following hypothesis:

**H5:** *VC attachment has a positive effect on VCCBI.*

## 2.5. Social Exchange and Satisfaction

We define satisfaction as one's cognitive evaluation and affective response to one's knowledge-sharing experience in a VC. One forms satisfaction judgments regarding the experience by evaluating the consequences of the behavior and by interpreting the process (Oliver, 1993). According to social exchange theory, beneficial behaviors are encouraged when members are satisfied that their needs are fulfilled. In VCs, members' satisfaction with knowledge sharing depends on their fulfilling the three needs for participating in the VC. In VCs, satisfying these needs is often a necessary condition for social exchanges to occur. In the present case, individuals forgo ownership of or relinquish the power of their knowledge because they expect to achieve their interests and gain utilities via social exchanges (Coleman, 1994). One such utility is the perception that knowledge sharing enhances one's self-achievement, gratification, and self-esteem in VCs (Wasko & Faraj, 2005). According to social exchange theory, three self-relevant forms of needs fulfillment (enabling the self, gratifying the self, and enriching the self) are exchangeable resources that can bring individuals satisfaction by fulfilling their self-oriented utility.

### 2.5.1. Enabling the Self and Satisfaction

People come to a VC for different reasons—some because the community fulfills functional needs, such as the need to obtain useful information (Sutanto et al., 2011), and others for the opportunity to enhance their knowledge sharing efficacy (Kankanhalli et al., 2005). Accordingly, a functional needs fulfillment (enabling the self) derived from a sense of an efficacious and capable self and mastery of knowledge satisfies members' feelings of self-enablement. According to Deci and Ryan (2000), the feeling or perception of competence is theorized to be important because it not only facilitates individuals' goal attainment but also provides them with a sense of needs satisfaction from interacting effectively with the environment and experiencing opportunities to express or develop their capabilities. Accordingly, we propose the following hypothesis:

**H6:** *Enabling the self has a positive effect on individuals' satisfaction with knowledge sharing.*

### 2.5.2. Gratifying the Self and Satisfaction

Hedonic needs fulfillment (gratifying the self) is a self-reward derived from the participation experience through satisfying members' stimulus-seeking needs, tension-release needs (such as the need to escape from the real world), and the need to seek affection in interpersonal relationships (Arnold & Reynolds, 2003). An important reason for individuals to participate in VCs is to fulfill the need for enjoyment derived from social interaction (Jin, Lee, & Cheung, 2010). Individuals will feel satisfied if the level of hedonic needs fulfillment is higher than or equal to their expectation (Jin et al., 2010). Cheung and Lee (2009) suggest that fulfilling the need for fun and relaxation through playing or otherwise interacting with others affects user satisfaction. Accordingly, we propose the following hypothesis:

**H7:** *Gratifying the self has a positive effect on individuals' satisfaction with knowledge sharing.*

### 2.5.3. Enriching the Self and Satisfaction

A symbolic needs fulfillment (enriching the self) enhances members' satisfaction as they recognize that knowledge sharing helps them retain a positive self-image and social status (Park et al., 2006). Korman (1970) hypothesize that "all other things being equal, individuals will engage in and find satisfying those behavioral roles which maximize their sense of cognitive balance or consistency" (p. 32). Consistent with Korman (1970), people with strong VC-based self-esteem should have a sense of personal adequacy and a sense of having satisfied their needs through their roles in the VC. Wasko and Faraj (2005) suggest that an individual participates in a VC with an expectation of enhancing their reputation in the VC. Thus, once the need for maintaining a positive self-image is fulfilled through a boost in self-esteem and social status in the VC, individuals are likely to experience a sense of satisfaction when sharing knowledge in the VC.

**H8:** *Enriching the self has a positive effect on individuals' satisfaction with knowledge sharing.*

### 2.5.4. Satisfaction and VCCB

Satisfaction has a powerful effect on ongoing behavior (Patterson & Spreng, 1997). Satisfied individuals are more likely to emotionally and normatively commit to relationships with other members and engage in behaviors that maintain these relationships (Rusbult & Buunk, 1993). According to social exchange theory, the norm of reciprocity implies that members strive to balance what they contribute to other members and what they receive from them. When members of a VC are satisfied with the knowledge sharing experience, they are more likely to reciprocate by engaging in VCCBI (Kim, Choi, & Han, 2004). Prior research has shown that an individual's satisfaction with the knowledge-sharing experience leads to helping others in the VC (Jin et al., 2010). Accordingly, we propose the following hypothesis:

**H9:** *Members' satisfaction with the knowledge-sharing experience has a positive effect on their VCCBI.*

Organizational studies have shown that satisfaction is one of the important predictors of OCB (Organ & Ryan, 1995). Williams and Anderson (1991) indicate that satisfied individuals are more likely to engage in citizenship behaviors directed toward benefiting the organization. Although knowledge sharing occurs among members, the VC is the one that provides the platform for knowledge sharing. Therefore, individuals may attribute their satisfaction with knowledge sharing indirectly to the VC and then engage in VCCBC as a form of reciprocal gratitude toward the VC. Prior research has shown that an individual's satisfaction leads to loyalty (Lin, 2008) and active participation in online communities (Jin et al., 2010). Accordingly, we propose the following hypothesis:

**H10:** *Members' satisfaction with the knowledge-sharing experience has a positive effect on their VCCBC.*

### 2.5.5. Satisfaction and VC Attachment

The organizational behavior literature (e.g., Bullock, 1952) suggests that an individual's satisfaction with an organization depends on whether the organization can contribute suitably to the individual's attaining their personal needs. Therefore, individuals will have strong emotional bonds to an organization if that organization helps them attain their personal needs and if they are satisfied with the organization's offerings (Hong & Yang, 2009). Similarly, when members of a VC are satisfied with its offerings regarding their needs, the members should also tend to be emotionally attached to the VC. Supporting this view, prior studies have consistently confirmed that satisfaction is a significant determinant of attachment in different contexts such as relationship marketing (Hennig-Thurau & Klee, 1997) and online communities (Jin et al., 2010). Accordingly, we propose the following hypothesis:

H11: *Members' satisfaction with the knowledge-sharing experience has a positive effect on VC attachment.*

**Table 2: Summary of Hypotheses**

H1: Enabling the self has a positive effect on VC attachment.
H2: Gratifying the self has a positive effect on VC attachment.
H3: Enriching the self has a positive effect on VC attachment.
H4: VC attachment has a positive effect on VCCBC.
H5: VC attachment has a positive effect on VCCBI.
H6: Enabling the self has a positive effect on individuals' satisfaction with knowledge sharing.
H7: Gratifying the self has a positive effect on individuals' satisfaction with knowledge sharing.
H8: Enriching the self has a positive effect on individuals' satisfaction with knowledge sharing.
H9: Members' satisfaction with the knowledge-sharing experience has a positive effect on their VCCBI.
H10: Members' satisfaction with the knowledge-sharing experience has a positive effect on their VCCBC.
H11: Members' satisfaction with the knowledge-sharing experience has a positive effect on VC attachment.

## 3. Research Methodology

### 3.1. Measurement Development

We adapted all measures of the study from existing measures to fit the context of virtual communities (see Appendix A). We originally developed the questionnaire and then translated into Chinese. We used one-way translation in which one of the authors translated the questionnaire from English into Chinese. Other authors then verified the conceptual rather than the literal equivalence between the two versions. To assess the logical consistency, ease of understanding, sequence of items, and contextual relevance of the measures, we conducted a pre-test involving six IS scholars and PhD students with knowledge-sharing experience in diverse IT professional VCs. Then, to assess the reliability and validity of the instrument, we conducted a pilot study with 158 knowledge contributors who were members of an open professional VC. We measured items with a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7).

### 3.2. Survey Administration

To test the hypotheses, we surveyed members of the professional VC known as Programmer Club. Participation in Programmer Club is available to all individuals interested in sharing professional knowledge about programming languages and software technologies. Members of Programmer Club are our target respondents since they are largely IS professionals, such as programmers, developers, systems analysts, system designers, IS engineers, and software engineers. Banners with a hyperlink

connecting to our Web survey were posted in Programmer Club forums. We invited members with knowledge-sharing experience during a four-week period to take this survey. The first page of the questionnaire explained the purpose of the study and ensured confidentiality. The Web survey yielded a total of 196 complete and valid responses for data analysis. We randomly selected thirty respondents with complete responses and offered them an incentive equivalent to USD\$17 in cash. Table 3 lists the demographic information related to the respondents.

**Table 3. Demographic Information of Respondents (N = 196)**

Measure	Items	Freq.	Percent	Measure	Items	Freq.	Percent
Gender	Male	145	74.0	Gender	Female	51	26.0
All participants							
Age	<25	36	18.4	Education	High school	9	4.6
	25-29	43	21.9		College	19	9.7
	30-34	47	24.0		University	94	47.9
	35 ~	70	35.7		Graduate school	74	37.8
Member history (in years)	<1	25	12.8	Usage of the VC per week	<30 minutes	53	27.0
	1-2	51	26.0		30-60 minutes	79	40.3
	2-3	27	13.8		1-2 hours	33	16.8
	3-4	19	9.7		2-4 hours	24	12.3
	4 ~	74	37.7		4 ~ hours	7	3.6
Note: each education level includes students.							

### 3.3. Data Analysis

We undertook a two-stage analysis on the data set. In the first stage, we performed exploratory factor analysis (EFA) with SPSS, while, in the second stage, we subjected the scales obtained as a result of the analysis in the first stage to structural equation modeling (SEM) analysis with SmartPLS 2.0 M3. We used SmartPLS because it allows one to model latent constructs with formative or reflective indicators as was the case with our model. PLS also places minimal restrictions on measurement scales, sample size, and residual distributions (Chin, Marcolin, & Newsted, 2003).

#### 3.3.1. Exploratory Factor Analysis

We conducted an exploratory factor analysis to check the factor structures of the constructs. We factor analyzed items for all the constructs, which yielded ten factors (see Appendix B). All items loaded on the expected factors with a loading score greater than the suggested value of 0.50 (Hair, Black, Babin, & Anderson, 2010). As Appendix B shows, the factor reliabilities (Cronbach's alpha) were all above 0.80, well above the commonly accepted value of 0.7.

#### 3.3.2. Structural Equation Modeling Analysis

**Testing the measurement model:** we modeled enabling the self, gratifying the self, and enriching the self all as second-order constructs with the reflective-formative approach: the first-order constructs are reflectively defined and the second-order constructs are formatively defined. Since PLS does not directly support second-order factors, we generated factor scores for each of their first-order dimensions, which we then used as formative measures (indicators) of the second-order constructs (see Chin et al., 2003). To do so, we first ran the full research model in SmartPLS with the dimensions for each construct disaggregated. We then used the resulting factor scores of the dimensions as the measures of the aggregate constructs (i.e., enabling the self, gratifying the self, and enriching the self).

We evaluated the adequacy of the measurement model with the criteria of reliability, convergent



validity, and discriminant validity. We examined reliability using the composite reliability values. Table 4 shows that all the values were above 0.7, the commonly accepted level. We assessed the convergent validity of the scales with two criteria (Fornell & Larcker, 1981): 1) all indicator loadings should be significant and exceed 0.7, and 2) average variance extracted (AVE) by each construct should exceed the variance caused by a measurement error for that construct (i.e., AVE should exceed 0.5). As Appendix C shows, all items exhibited a loading higher than 0.7 on their respective construct, and, as Table 4 shows, all the AVEs ranged from 0.70 to 0.85 and, thus, satisfied both conditions for convergent validity.

We assessed discriminant validity with three criteria. First, the correlations among the constructs should be well below 0.85 (Kline, 2005). Second, when the loading of each measurement item on its assigned construct is larger than its loadings on all other constructs and the cross-loading differences are much higher than the suggested threshold of 0.1 (Gefen & Straub, 2005), the scales will be considered as having sufficient discriminant validity (Chin, 1998). Third, the square root of the AVE of a construct should be greater than the correlations between the construct and all other constructs in the model (Fornell & Larcker, 1981). As Table 5 shows, the correlations among the constructs were well below the 0.85 threshold. MacKenzie, Podsakoff, and Podsakoff (2011) suggest that a more stringent method of assessing discriminant validity might be to test whether the construct intercorrelations are each less than 0.71. As Table 5 shows, all correlations were less than the 0.71 threshold. As Appendix C shows, the differences between loadings on assigned constructs and those on other constructs were larger than the threshold of 0.1. In fact, all of the 351 cross-loading differences are larger than 0.2. In addition, all the AVE square roots were larger than the construct intercorrelations (see Table 5), which demonstrates sufficient discriminant validity.

Our analysis (Appendix D) also showed that common method bias and multicollinearity should not be of serious concern for our study. In addition, we assessed the validity of treating enabling the self, gratifying the self, and enriching the self as second-order, formative constructs by 1) assessing the multicollinearity among the first-order constructs and 2) examining the path weights and correlations between the first-order constructs and the second-order constructs (Cenfetelli & Bassellier, 2009). The results in Appendix E support modeling the three self concepts as second-order formative constructs.

**Testing the structural model:** in PLS analysis, examining the structural paths and the R<sup>2</sup> scores of endogenous variables assesses the explanatory power of a structural model. Figure 2 shows the results of the structural path analysis. All paths exhibited a P-value less than 0.05. We assessed the significance of all paths with 500 bootstrapping runs. Overall, the research model accounted for 41 percent of the variance of VCCBC and 41 percent of the variance of VCCBI (Figure 2).

**Table 4. Descriptive Statistics of Constructs**

Constructs	Items	Composite reliability	Mean (STD)	AVE
Knowledge-sharing efficacy (KSE)	4	0.95	5.30 (1.09)	0.84
Self-reflection learning (SRL)	4	0.92	5.69 (0.94)	0.75
Solitary playfulness (SIP)	4	0.91	5.27 (1.04)	0.71
Social playfulness (SOP)	4	0.95	5.40 (0.98)	0.82
Self-esteem enhancement (SEE)	4	0.94	5.23 (0.97)	0.80
Social enhancement (SOE)	4	0.94	5.20 (0.98)	0.79
Virtual community attachment (VCA)	4	0.93	5.27 (1.00)	0.78
Satisfaction (SA)	3	0.94	5.61 (0.88)	0.85
VCCB toward community (VCCBC)	4	0.93	5.05 (1.11)	0.76
VCCB toward individuals (VCCBI)	4	0.91	5.78 (0.90)	0.70

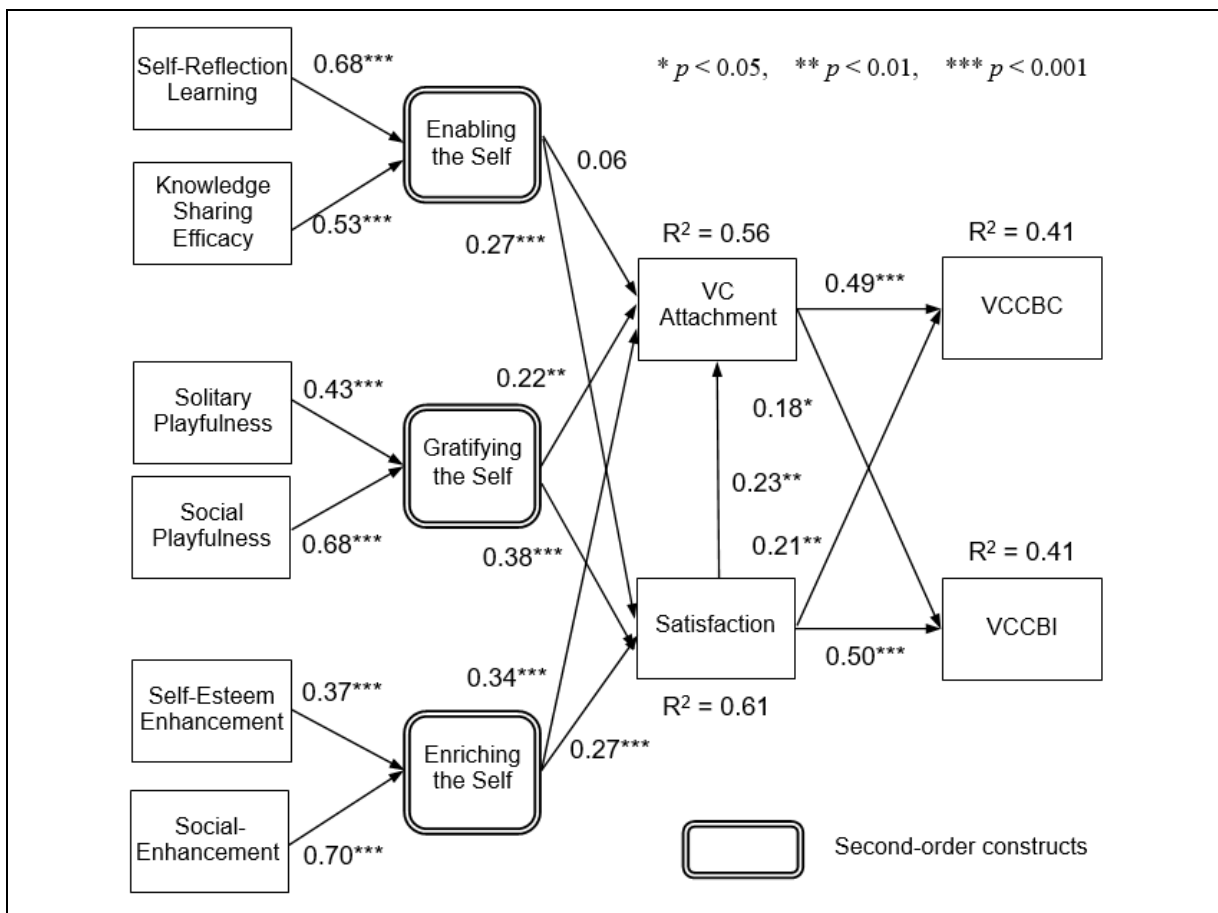
**Table 5. Correlation Among Constructs and the Square Root of the AVE**

	VCA	KSE	SA	SEE	SIP	SRL	SOE	SOP	VCCBC	VCCBI
VCA	<b>0.88</b>									
KSE	0.38	<b>0.92</b>								
SA	0.65	0.46	<b>0.92</b>							
SEE	0.58	0.43	0.61	<b>0.89</b>						
SIP	0.56	0.31	0.59	0.63	<b>0.84</b>					
SRL	0.43	0.37	0.52	0.49	0.47	<b>0.87</b>				
SOE	0.67	0.36	0.66	0.69	0.57	0.44	<b>0.89</b>			
SOP	0.62	0.25	0.67	0.58	0.62	0.39	0.64	<b>0.91</b>		
VCCBC	0.62	0.18	0.53	0.47	0.49	0.43	0.53	0.63	<b>0.87</b>	
VCCBI	0.51	0.46	0.62	0.47	0.43	0.56	0.46	0.52	0.36	<b>0.84</b>

Note: The square roots of AVEs are in boldface.

Legend: VCA = virtual community attachment  
SA = satisfaction  
SIP = solitary playfulness  
SOE = social enhancement  
VCCBI = VCCB toward individuals

KSE = knowledge-sharing efficacy  
SEE = self-esteem enhancement  
SRL = self-reflection learning  
SOP = social playfulness  
VCCBC = VCCB toward community



**Figure 2. SEM Analysis of the Research Model**

## 4. Discussion and Implications

This study addresses the critical but unexplored question of whether virtual community attachment, in addition to satisfaction, adds value as a construct of interest to VC researchers. Against this backdrop, we developed and tested a theoretical model that helps explain what makes people attach to a VC and behave like a good citizen of the VC.

### 4.1. Summary of Results

The results of the present study suggest that knowledge contributors do engage in VCCBC and VCCBI in professional VCs with mean values of 5.05 and 5.78, respectively. VCCBI had a higher mean value (5.78), which suggests that citizenship behaviors directed toward benefiting other individuals (e.g., helping other members) are the major characteristic of open professional VCs. In other words, open professional VCs are more helping oriented in nature. Knowledge sharing is a helping behavior and the main reason for open professional VCs to exist. Our findings imply that individuals who share their knowledge in a VC are also likely to perform beneficial behaviors directed toward the VC because of their attachment to the VC and their satisfaction with the knowledge sharing experience.

We proposed VC attachment and satisfaction as the antecedents of VCCBC. Both the proposed links were significant, and these two factors explained 41 percent of the variances in VCCBC. Although prior research in organizational behavior suggests that satisfaction is an important driver of citizenship behaviors, our results show the added value of examining attachment because it predicted VCCBC more strongly than satisfaction. Our findings support our conjecture that individuals may attribute their satisfaction with knowledge sharing indirectly to the VC and, thus, are less motivated to engage in VCCBC as reciprocal gratitude toward the VC. The willingness to perform VCCBC may be more motivated by the affection, connection, and passion reflected by VC attachment.

Our findings suggest that satisfaction and attachment are significant determinants of VCCBI, and they explained 41 percent of the variances in VCCBI. Consistent with prior management studies (Organ & Ryan, 1995; Podsakoff, MacKenzie, Paine, & Bachrach, 2000), we show that satisfaction had a strong effect on VCCBI in our model, and the effect was stronger than that of VC attachment. Satisfaction also had an indirect effect on VCCBC through VC attachment. These findings support our conjecture that enhanced satisfaction ensuing from the fulfillment of key aspects of the self may, in turn, stimulate knowledge contributors to engage in citizenship behaviors toward other members out of a desire to reciprocate the feeling of satisfaction that they have experienced. Our findings suggest that such a norm of reciprocity is stronger when the target is individuals and, thus, that it has less power in driving VCCBC.

Specifically, we provide evidence that gratifying and enriching the self are critical for inducing members to create an attachment to VCs. These two factors together with enabling the self explained 56 percent of the variances in VC attachment. We can explain the results from the perspectives of affective commitment, social identity, and brand attachment. A member's attachment to a VC can be derived from their fulfilling their deep-seated, self-definitional needs. As prior studies have suggested, VCs can serve as a channel for social interactions and, therefore, act as a vehicle for self-concept improvement (e.g., McKenna, Green, & Gleason, 2002). Moreover, attachment becomes associated with hedonic and symbolic elements as favorable emotions and cognitive evaluations make people want to repeat the pleasant experiences and, thus, generate attachment. Our results indicate that, even though the main purpose of professional VCs is to support professional activities, their ability to fulfill knowledge contributors' goals for enriching the self ( $\beta = 0.34$ ) may be more salient than enabling the self and gratifying the self (i.e.,  $\beta = 0.06$  and  $\beta = 0.22$ , respectively) in increasing individuals' attachment to VCs. Contrary to our expectation, enabling the self did not have a significant effect on attachment to the VC. A possible explanation is that, since the VC studied here is a professional one rather than a general website, members' levels of perceived knowledge sharing efficacy and self-reflection learning may be systemically higher and, thus, weaken the relationship between enabling the self and VC attachment. However, enabling the self, gratifying the self, and enriching the self were all associated with members' satisfaction with the knowledge-sharing experience. These three factors

explained 61 percent of the variances in satisfaction, and gratifying the self ( $\beta = 0.38$ ) took the lead in shaping satisfaction.

Our results support treating enabling the self as a multifaceted construct with two dimensions: knowledge-sharing efficacy and self-reflection learning. Self-reflection learning was more important as a component of enabling the self knowledge sharing efficacy (weighted 0.68 and 0.53, respectively). Thus, developing a new perspective or having a better understanding of the discussed topics or issues through reflective learning during the knowledge sharing process in a VC was a critical type of needs fulfillment for enabling the self. Though less significant, our results nevertheless support Kankanhalli et al.'s (2005) notion of knowledge sharing efficacy that, when individuals contribute knowledge useful to a VC, they gain confidence in terms of what they can do, which brings the benefit of enabling the self.

Solitary playfulness and social playfulness were important components for gratifying the self (weighted 0.43 and 0.68, respectively). The result is consistent with Sutanto et al.'s (2011) study, which shows that individuals can obtain personal enjoyment in a professional VC for product discussion. Shah (2006) indicates that enjoyment is the main motivation for developers' contributions in an open source community, and a critical subset of developers (hobbyists) participate because they derive enjoyment from the act of creating code. Osterloh and Rota (2007) indicate that many members of the open source community emphasize that the most important motive for participation is having fun. Writing or debugging software is an intellectually challenging flow experience activity (Osterloh & Rota, 2007). Open source developers obtain personal enjoyment from performing an intellectually challenging activity (Lakhani & von Hippel, 2003). Zhang, Hahn, and De (2013) suggest that developers may obtain enjoyment from both interactions with community members and interactions with the software code. The open source community is a type of professional VC. Accordingly, it is possible that hobbyists and non-hobbyist members in a professional VC may obtain enjoyment from interacting with other others and from reading and posting knowledge. What distinguishes this study from previous studies is that we further investigate the distinction between solitary playfulness and social playfulness, which has not received much attention in the professional VC literature. Our results suggest that social playfulness is more important than solitary playfulness in forming self-gratification.

Both self-esteem enhancement and social enhancement were important in enriching the self (weighted 0.37 and 0.70, respectively). Our findings extend previous evidence linking reputation to knowledge contribution (Wasko & Faraj, 2005) by showing that social enhancement is an important type of needs fulfillment for enriching the self. The results are also consistent with the core concept of social identity theory: individuals have the desire to maintain, protect and enhance their self-esteem and participate in a social group to satisfy their need for self-esteem.

## 4.2. Theoretical Implications

This study explicitly differentiates between VCCBC and VCCBI and, thereby, improves our understanding of VC members' beneficial behaviors (e.g., Ren et al., 2012). Ren et al. (2012) identify two types of VC members' beneficial behaviors (willingness to help the group and willingness to help individuals) and two types of attachment (to the group and to individuals). They theorize that attachment to the group will increase members' willingness to exert effort to help the group and that attachment to individuals will increase members' willingness to exert effort to help other members. They used behavioral data to measure willingness to help the group and willingness to help individuals, but their data failed to support the proposed relationships. Our conceptualization of VCCBC and VCCBI is multifaceted and based on individuals' perceptions of behaviors beneficial to the VC, and the measurements based on such conceptualization appeared to be appropriate empirically.

Ren et al. (2012) urge researchers to move beyond focusing on just one type of beneficial behaviors in the VC (i.e., either knowledge sharing or helping others). Their study suggests that attachment to the groups in a VC leads to attachment to the large VC as a whole, which, in turn, leads to participation and retention. Their research model, however, ignores the relationships between

attachment to the large VC as a whole and willingness to help the VC and other members. Our findings suggest the importance of VC attachment in generating VCCBC and VCCBI.

Our results suggest that, in addition to satisfaction, attachment (though largely ignored in the literature) could be a key determinant of citizenship behaviors, especially in organizations with voluntary participation, such as VCs. Thus, both concepts should be considered when explaining citizenship behavior in communities in general and in professional virtual communities in particular. The magnitudes of the path coefficients of VC attachment on VCCBC and satisfaction on VCCBI further imply that they are indeed critical and complementary drivers of VCCB. The study, therefore, extends the citizenship behavior literature from employee-organization relationships to member-VC relationships and sheds new light on the potential of VC attachment and satisfaction in triggering VCCB.

Our results reinforce previous findings regarding OCB and suggest that the dimensionality of OCB is better captured on the basis of the target or direction of behaviors to gain additional knowledge regarding the motivations for those behaviors. The relationship between VC attachment and VCCBI remained significant even when considering member satisfaction. This finding suggests that, in the VC setting, factors other than satisfaction could also stimulate citizenship behaviors that benefit other individuals. Nevertheless, the effect of satisfaction on VCCBI was stronger than that of VC attachment. Compared to attachment, satisfaction was relatively more cognitively oriented. Thus, our findings suggest that people engage in VCCBI for stronger cognitive reasons. It might be better to think of VCCBI more as cognition-driven behaviors than as emotion-driven behaviors. Our findings also suggest that individuals may base their decisions to perform VCCBI more on their need to reciprocate the feeling of satisfaction than on their need to maintain proximity with the VC. In addition, VC attachment had a stronger effect on VCCBC than satisfaction. VC attachment represented a positive emotional response to the positive appraisal of the VC. Our findings suggest that people engage in VCCBC more strongly for affective reasons, while Organ and Konovsky's (1989) results indicate that OCB is more related to cognitive variables than to affective variables. Thus, the relative importance of affect and cognition on citizenship behaviors might depend on the types of citizenship behaviors and their targets.

Ren et al.'s (2012) study emphasizes the technological antecedents of attachment to the group. Our study sheds new light on the potential of self-concepts in triggering VC attachment. Vlachos et al. (2010) applied Park et al.'s (2006) framework to the retail context and found that enriching the self had a dominant effect on attachment. Consistent with their findings, our results indicate that enriching the self is more influential in shaping members' attachment to the professional VC. It appears that the important role of enriching the self in leading to VC attachment holds for different contexts. Thus, we suspect that the important role of enriching the self in leading to attachment should hold for most online websites. In terms of increasing contributors' satisfaction, gratifying the self takes the lead. Thus, one critical theoretical implication of this study is that fulfilling different dimensions of the self could have differential effects on members' attachment to and satisfaction with a VC.

This study extends Park et al.'s (2006) framework by showing that antecedents of attachment (enabling the self, gratifying the self, and enriching the self) have their own components (self-reflection learning, solitary playfulness, social enhancement, etc.). We explicitly identify the components of the three aspects of self-concept using the theoretical lens of social and solitary needs and, thereby, extend our understanding of the possible types of needs fulfillment for enhancing the VC-self connection.

Previous research (e.g., Bock et al., 2005; Phang, Kankanhalli, & Sabherwal, 2009; Wasko & Faraj, 2005) has addressed the various needs to be fulfilled by knowledge sharing but examined their individual effects instead of their integrative effects on knowledge sharing behavior. By modeling enabling the self, gratifying the self, and enriching the self as second-order formative constructs in an integrative model, we demonstrate the over-arching effects of these constructs on knowledge contributors' attachment to the VC and satisfaction with the knowledge-sharing experience, which lead to desirable citizenship behaviors.



### 4.3. Implications for Practice

We shows that knowledge contributors are motivated to engage in citizenship behaviors by their satisfaction with and attachment to a VC. Although knowledge contributors could self-derive some drivers of satisfaction and VC attachment (e.g., solitary playfulness), managers or hosts of VCs should develop strategies and mechanisms to provide or enhance the value they add to knowledge sharing and other beneficial behaviors even though such added value could be largely intangible. Our findings suggest that the social playfulness component is stronger than solitary playfulness in forming gratification. From the perspective of a manager or host of a VC, it would be especially unfortunate to interpret our results as implying that solitary playfulness may be paid less attention. The appropriate interpretation should be that, given the situational context of our sample, further increases in solitary playfulness could be less potent than similar increases in social playfulness in the knowledge-sharing activity. Nevertheless, the importance of solitary playfulness should not be overlooked. Developers and designers of VCs can create a more enjoyable knowledge-sharing environment in different ways. First, they can incorporate innovative multimedia tools and techniques to make the knowledge-sharing process and the interaction between members more interesting and entertaining. Second, hosts or managers of VCs should encourage their members to provide more interesting content. Finally, they should develop strategies to encourage interactions and the formation of relationships among members to enhance the playfulness of the knowledge sharing in their VCs (Gupta & Kim, 2007). Of course, offline interaction/activity remains a useful approach to strengthening the relational ties among VC members.

Attracting and retaining a set of experienced core knowledge contributors is important to developing and maintaining an open professional VC (Wasko & Faraj, 2005). Enhancing these core knowledge contributors' social status in the VC and raising their sense of self-esteem are possible approaches. Many VCs use a reputation or ranking system to help individuals form their identity as experts in particular areas. Forming an expert identity (e.g., deep profile) is also helpful for advancing knowledge contributors' careers. Inviting top knowledge contributors to serve as hosts of particular topics is another approach to enhancing their sense of self-esteem and of respect from other members.

The significant weights of self-reflection learning and knowledge sharing efficacy in our results suggest that individuals not only participate in VCs to help other members by sharing knowledge but also expect to advance their own knowledge through reflective thinking to enhance their own capabilities. VC managers should develop strategies and provide tools that give knowledge contributors the opportunity to clarify and reflect on their thinking and then achieve deeper learning. Maintaining a dynamic balance between knowledge contributors' abilities (skills) and levels of challenge is the key to enhancing their self-efficacy and their experience of the fun in knowledge sharing. VCs can provide a system that allows individuals or other highly skilled knowledge contributors to rate the difficulty of the posted questions and then automatically indicates the expertise level needed to answer those questions. Members can use the expertise level information provided by the reputation system and the ranking system to check whether the level of a posted question is challenging enough for their own expertise level.

Two symbolic types of needs fulfillment (self-esteem enhancement and social enhancement) are among the possible reasons why knowledge contributors become attached to a VC. When VC managers develop strategies and tools to increase other sources of functional and hedonic needs fulfillment, they might simultaneously increase knowledge contributors' community satisfaction, which then leads to greater attachment to the VC. Overall, VC attachment can be enhanced either directly or indirectly by increasing functional, hedonic, and symbolic needs fulfillment. Accordingly, how to design various mechanisms to properly provide these three types of needs fulfillment deserves much attention from VC practitioners.

## 5. Conclusion

With this study, we expand the horizon of citizenship behavior research, which has been largely limited to organizational behavior, by examining attachment as an alternative mechanism—beyond member satisfaction—to foster more advanced member-VC relationships. Drawing on Park et al.'s

(2006) three aspects of the self-concept, we recognize suitable types of needs fulfillment for enhancing the VC-self connection and, consequently, member-VC attachment. Our findings indicate that members of a VC strive for enablement, gratification, and enrichment and that fulfilling those needs nurtures members' attachment to the VC and, subsequently, fosters citizenship behaviors. We believe that the model we propose in this paper is not conceptually limited to VCs but should also be applicable to other online services. Certainly, more effort should be directed to further reveal the complex relationships among self-concept, attachment, and citizenship behaviors. We hope that the model proposed in this study can lay a useful foundation for future work in this important area.

We note that our findings have several limitations. First, we think the findings could be generalized to many VCs that are organized around a particular topic such as social support, education, or a profession. Some of our findings, such as the relative importance of VC attachment in fostering VCCBC and the relative importance of enriching the self in fostering VC attachment might not be generalized to socially oriented communities such as social networking sites where members join for fun and interpersonal relationships. Citizenship behaviors in open professional VCs might also be different from those of VCs residing inside organizations. In these communities, fostering VCCBC and VC attachment may be more difficult and, thus weak the relationship between them. Caution should also be taken when generalizing our findings to VC communities hosted by organizations to foster knowledge sharing among their employees. Compared with members of open VCs, organizational employees have often already built emotional bonds to the organization. In addition, we need further research to examine the generalizability of our findings, especially the relative importance of the self concepts in different contexts. Second, the results may have been impacted by selection bias since our sample comprised only current knowledge contributors. Individuals who have already left the VC might have different perceptions about the influence of the various dimensions of functional, hedonic, and symbolic needs fulfillment (i.e., enabling the self, gratifying the self, and enriching the self). Therefore, the results should be interpreted as only explaining the VCCB of knowledge contributors currently in VCs. Third, because the majority of our respondents were male (74%), our results could be gender biased. However, this ratio is consistent with the gender ratio of a nationwide survey of IS professionals released by Taiwan's Ministry of Economic Affairs in 2012, which indicated that 75 percent of the IS professionals in Taiwan are male<sup>2</sup>, which suggests that our sample is representative. Finally, as the data are cross-sectional, all the statistically supported relationships can only be viewed as tentative.

Lastly, subjective well-being (SWB) is an individual's cognitive and affective evaluation of the extent to which the individual experiences pleasant emotions, low levels of negative mood, and high life satisfaction (Diener, Lucas, & Oishi, 2005). Subjective well-being focuses on happiness and life satisfaction and is different from the satisfaction concept of this study, which focuses on satisfaction with the knowledge sharing experience. According to self-determination theory (Deci & Ryan, 1985), individuals are self-determining and intrinsically motivated to continue using a VC and saying positive things about it when they feel happy about doing so. Therefore, an interesting area for future research is to examine the relationships among subjective well-being, satisfaction, VC attachment, and VCCB. Also, personality tends to alter the cognitive construction of an individual's environment and shape the meaning of the various responses to that environment (Schneider, 1983). Researchers have found the "big five" personality traits to be important to understanding and predicting human behaviors. These traits are most often called agreeableness, conscientiousness, emotional stability, extraversion, and openness to experience. Therefore, another interesting area of future research is to extend the research model by including the "big five" personality traits and examining their possible effects on satisfaction, attachment and VCCB.

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<sup>2</sup> [http://itriexpress.blogspot.tw/2013/07/2013-2015\\_1449.html](http://itriexpress.blogspot.tw/2013/07/2013-2015_1449.html), August, 2014.

## References

- Abrams, D., & Hogg, M. A. (1988). Comments on the motivational status of self-esteem in social identity and intergroup discrimination. *European Journal of Social Psychology*, 18(4), 317-334.
- Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance, and normative commitment to the organization. *Journal of Occupational Psychology*, 63(1), 1-18.
- Arnold, M. J., & Reynolds, K. E. (2003). Hedonic shopping motivations. *Journal of Retailing*, 79(2), 77-95.
- Ball-Rokeach, S. J., Rokeach, M., & Grube, J. (1984). *The great American values test: Influencing behavior and belief through television*. New York: The Free Press.
- Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly*, 36(3), 421-458.
- Bateman, P. J., Gray, P. H., & Butler, B. S. (2011). The impact of community commitment on participation in online communities. *Information Systems Research*, 22(4), 841-854.
- Blanchard, A. L., & Markus, M. L. (2004). The experienced "sense" of a virtual community: Characteristics and processes. *The Data Base for Advanced in Information Systems*, 35(1), 64-71.
- Blanchard, A. K., Askay, D. A., & Callas, K. A. (2010). Sense of community in professional virtual communities. In S. Long (Ed.), *Communication, relationships, and practices in virtual work* (pp. 161-176). New York: IGI Global.
- Bowlby, J. (1951). Maternal care and mental health. *Bulletin of the World Health Organization*, 3(3), 355-533.
- Bowlby, J. (1979). *The making and breaking of affectional bonds*. London: Tavistock.
- Bowlby, J. (1988). *A secure base*. New York: Basic Books.
- Bock, G. W., Zmud, R. W., Kim, Y. G., & Lee, J. N. (2005). Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social- psychological forces, and organizational climate. *MIS Quarterly*, 29(1), 87-111.
- Bretherton, I., & Munholland, K. A. (1999). Internal working models in attachment: A construct revisited. In J. Cassidy & P. Shaver (Eds.), *Handbook of attachment: Theory, research and clinical application* (pp. 89-111). New York: Guilford Press.
- Bullock, R. P. (1952). *Social factors related to job satisfaction: A technique for the measurement of job satisfaction*. Columbus, OH: Ohio State University Press.
- Butler, B., Sproull, L., Kiesler, S., & Kraut, R. E. (2007). Community effort in online groups: Who does the work and why? In S. Weisband (Ed.), *Leadership at a distance* (pp. 171-194). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Caplan, R. D. (1987). Person-environment fit theory and organizations: Commensurate dimensions, time perspectives, and mechanisms. *Journal of Vocational Behavior*, 31(3), 248-267.
- Cenfetelli, R., & Bassellier, G. (2009). Interpretation of formative measurement in information systems research. *MIS Quarterly*, 33(4), 689-707.
- Chen, M. J., Chen, C. D., & Farn, C. K. (2010). Exploring determinants of citizenship behavior on virtual communities of consumption: The perspective of social exchange theory. *International Journal of Electronic Business Management*, 8(3), 195-205.
- Cheung, C. M. K., & Lee, M. K. O. (2009). Understanding the sustainability of a virtual community: Model development and empirical test. *Journal of Information Science*, 35(3), 279-298.
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295-336). Mahwah: Lawrence Erlbaum Associates.
- Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information Systems Research*, 14(2), 189-217.
- Chiu, C. M., Hsu, M. H., & Wang, T. G. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. *Decision Support Systems*, 42(3), 1872-1888.
- Coleman, J. S. (1994). A rational choice perspective on economic sociology. In N. J. Smelser & R. Swedberg (Eds.), *The handbook of economic sociology* (pp. 166-182). Princeton: Princeton University Press.

- Conway, J. C., & Rubin, A. M. (1991). Psychological predictors of television viewing motivation. *Communication Research*, 18(4), 443-463.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227-268.
- DeFleur, M. L., & Ball-Rokeach, S. J. (1989). *Theories of mass communication* (5<sup>th</sup> ed.). New York: Longman.
- Dholakia, U. M., Bagozzi, R. P., & Klein, L. R. (2004). A social influence model of consumer participation in network and small group-based virtual communities. *International Journal of Research in Marketing*, 21(3), 241-263.
- Diener, E., Lucas, R. E., & Oishi, S. (2005). Subjective well-being: The science of happiness and life satisfaction. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 63-73). New York: Oxford University Press.
- Diamantopoulos, A., & Siguaw, J. A. (2006). Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*, 17(4), 263-82.
- Dunkel, C. S. (2005). The relationship between self-continuity and measures of identity. *Identity. An International Journal of Theory and Research*, 5(1), 21-34.
- Dutton, J. E., Dukerich, J. M., & Harquail, C. V. (1994). Organizational images and member identification. *Administrative Science Quarterly*, 39(2), 239-263.
- Erikson, E. H. (1980). *Identity and the life cycle*. New York: W. W. Norton.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable and measurement error. *Journal of Marketing Research*, 18(1), 39-50.
- Garcia-Prieto, P., & Scherer, K. (2006). Connecting social identity theory to cognitive appraisal theory of emotions. In R. Brown & D. Capozza (Eds.), *Social identities: Motivational, emotional, cultural influences* (pp. 189-207). Hove: Psychology Press.
- Gefen, D., & Straub, D. W. (2005). A practical guide to factorial validity using PLS-Graph: Tutorial and annotated example. *Communications of AIS*, 16(1), 91-109.
- Gilbert, S., Laschinger, H. K. S., & Leiter, M. (2010). The mediating effect of burnout on the relationship between structural empowerment and organizational citizenship behaviours. *Journal of Nursing Management*, 18(3), 339-348.
- Gupta, S., & Kim, H. W. (2007). Developing the commitment to virtual community: The balanced effects of cognition and affect. *Information Resource Management Journal*, 20(1), 28-45.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective* (7<sup>th</sup> ed.). New Jersey: Pearson Prentice Hall.
- Hazan, C., & Shaver, P. R. (1994). Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*, 5(1), 1-22.
- Hennig-Thurau, T., & Klee, A. (1997). The impact of customer satisfaction and relationship quality on customer retention: A critical reassessment and model development. *Psychology and Marketing*, 14(8), 737-764.
- Hogg, M. A. (1996). Intragroup processes, group structure, and social identity. In W. P. Robinson (Ed.), *Social groups and identities: Developing the Legacy of Henri Tajfel* (pp. 65-93). Oxford: Butterworth-Heinemann.
- Hogg, M. A. (2003). Social identity. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 462-479). New York: Guilford.
- Hong, S. Y., & Yang, S. U. (2009). Effects of reputation, relational satisfaction, and customer-company identification on positive word-of-mouth intentions. *Journal of Public Relations Research*, 21(4), 381-403.
- Hsu, C. P., Chiang, Y. F., & Huang, H. C. (2012). How experience-driven community identification generates trust and engagement. *Online Information Review*, 36(1), 72 -88.
- Jin, X. L., Lee, M. K. O., & Cheung, C. M. K. (2010). Predicting continuance in online communities: Model development and empirical test. *Behaviour and Information Technology*, 29(4), 383-394.
- Jin, X. -L., Zhou, Z., Lee, M. K. O., & Cheung, C. M. K. (2013). Why users keep answering questions in online question answering communities: A theoretical and empirical investigation. *International Journal of Information Management*, 33(1), 93-104.



- Jorgensen, B. S., & Stedman, R. C. (2006). A comparative analysis of predictors of sense of place dimensions: Attachment to, dependence on, and identification with lakeshore properties. *Journal of Environmental Management*, 79(3), 316-327.
- Kankanhalli, A., Tan, B., & Wei, K. K. (2005). Contributing knowledge to electronic knowledge repositories: An empirical investigation. *MIS Quarterly*, 29(1), 113-143.
- Kim, J. W., Choi, J., & Han, K. (2004). Relationship support activities, community, commitment, and voluntary behaviour in online communities. *International Journal of Internet Marketing and Advertising*, 1(4), 431-449.
- Kim, Y., Baker, J., & Song, J. (2007). An exploratory study of social factors influencing virtual community members' satisfaction with avatars. *Communications of the AIS*, 20, 567-593.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2<sup>nd</sup> ed.). London: The Guilford Press.
- Koh J., & Kim, Y.-G. (2003). Sense of virtual community: A conceptual framework and empirical validation. *International Journal of Electronic Commerce*, 8(2), 75-94.
- Korman, A. K. (1970). Toward an hypothesis of work behavior. *Journal of Applied Psychology*, 54(1), 31-41.
- Lakhani, K. R., & von Hippel, E. (2003). How open source software works: "Free" user-to-user assistance. *Research Policy*, 32(6), 923-943.
- Lee, K., & Allen, N. J. (2002). Organizational citizenship behavior and workplace deviance: The role of affect and cognitions. *Journal of Applied Psychology*, 87(1), 131-142.
- Lin, H. F. (2008). Determinants of successful virtual communities: Contributions from system characteristics and social factors. *Information & Management*, 45(8), 522-527.
- Lin, P. C. (2010). Learning virtual community loyalty behaviour from a perspective of social cognitive theory. *International Journal of Human-Computer Interaction*, 26(4), 345-360.
- Mackenzie, S. B., Podsakoff, M. P., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, 35(2), 293-334.
- McKenna, K., Green, A., & Gleason, M. (2002). Relationship formation on the Internet: What's the big attraction? *Journal of Social Issues*, 58, 9-31.
- McQuail, D., Blumler, J. G., & Brown, J. R. (1972). The television audience: A revised perspective. In D. McQuail (Ed.), *Sociology of mass communications: Selected readings* (pp. 135-165). Harmondsworth: Penguin.
- Meyer, J. P., & Allen, N. J. (1991). A three component conceptualization of organization commitment. *Human Resource Management Review*, 1(1), 61-89.
- Mikulincer, M., & Shaver, P. R. (2005). Mental representations of attachment security: Theoretical foundation for a positive social psychology. In M. W. Baldwin (Ed.), *Interpersonal cognition* (pp. 233- 266). New York: Guilford Press.
- Moon, J. (1999). *Reflection in learning and professional development: Theory and practice*. London: Kogan Page.
- Mowday, R. T., Steers, R. M., & Porter, L. W. (1979). The measurement of organizational commitment. *Journal of Vocational Behavior*, 14(2), 224-247.
- Nelson Laird, T. F. N., Shoup, R., & Kuh, G. D. (2005). Deep learning and college outcomes: Do fields of study differ? In *Proceedings of the Annual Conference of the California Association for Institutional Research*.
- Oliver, R. L. (1993). Cognitive, affective, and attribute based of the satisfaction response. *Journal of Consumer Research*, 20, 418-430.
- Oliver, R. L. (1995). Attribute need fulfillment in product usage satisfaction. *Psychology and Marketing*, 12(1), 1-17.
- Organ, D. W., & Konovsky, M. A. (1989). Cognitive versus affective determinants of organizational citizenship behavior. *Journal of Applied Psychology*, 74(1), 157-164.
- Organ, D. W. (1988) *Organizational citizenship behavior: The good soldier syndrome*. Lexington Books, MA: Lexington.
- Organ, D. W., & Ryan, K. (1995). A meta-analytic review of attitudinal and dispositional predictors of organizational citizenship behavior. *Personnel Psychology*, 48(4), 775-802.
- Osterloh, M., & Rota, S. G. (2007). Open source software development—just another case of collective invention? *Research Policy*, 36(2), 157-171.



- Park, C. W., MacInnis, D. J., & Priester, J. (2006). Beyond attitudes: Attachment and consumer behavior. *Seoul National Journal*, 12(2), 3-36.
- Park, C. W., MacInnis, D. J., & Priester, J. (2008). Brand attachment: Constructs, consequences, and causes. *Foundations and Trends in Marketing*, 1(3), 191-230.
- Park, C. W., MacInnis, D. J., Priester, J., Eisingerich, A. B., & Iacobucci, D. (2010). Brand attachment and brand attitude strength: Conceptual and empirical differentiation of two critical brand equity drivers. *Journal of Marketing*, 74, 1-17.
- Patterson, P. G., & Spreng, R. A. (1997). Modeling the relationship between perceived value, satisfaction and repurchase intentions in a business-to-business, services context: An empirical examination. *International Journal of Service Industry Management*, 8(5), 414-434.
- Petter, S., Straub, D., & Rai, A. (2007). Specifying formative constructs in information systems research. *MIS Quarterly*, 31(4), 623-656.
- Phang, C. W., Kankanhalli, A., & Sabherwal, R. (2009). Usability and sociability in online communities: A comparative study of knowledge seeking and contribution. *Journal of the Association for Information Systems*, 10(10), 721-747.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *Leadership Quarterly*, 1(2), 107-142.
- Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of Management*, 26(3), 513-563.
- Ren, Y., Harper, F. M., Drenner, S., Terveen, L., Kiesler, S., Riedl, J., & Kraut, R. (2012). Building member attachment in online communities: Applying theories of group identity and interpersonal bonds. *MIS Quarterly*, 36(3), 841-864.
- Riketta, M. (2008). Who identifies with which group? The motive-feature match principle and its limitations. *European Journal of Social Psychology*, 38(4), 715-735.
- Riketta, M., Van Dick, R., & Rousseau, D. M. (2006). Employee attachment in the short and long run: Antecedents and consequences of situated and deep-structure identification. *Zeitschrift fuer Personalpsychologie*, 5(3), 85-93.
- Rodgers, S., & Chen, Q. (2005). Internet community group participation: Psychosocial benefits for women with breast cancer. *Journal of Computer-Mediated Communication*, 10(4), 1-42.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. New Jersey: Princeton University Press.
- Ryoo, S. Y., & Kwak, S. H. (2011). Exploring organizational citizenship behavior in virtual communities. In *Proceedings of New Challenges for Intelligent Information and Database Systems* (pp. 289-298). Berlin: Springer.
- Rusbult, C. E., & Buunk, B. P. (1993). Commitment processes in close relationships: An interdependence analysis. *Journal of Social and Personal Relationships*, 10(2), 175-204.
- Santos, I., & Hammond, M. (2007). Learning community or community-minded learning group? *Journal of Internet Commerce*, 6(2), 51-72.
- Saraf, N., Langdon, C. S., & Gosain, S. (2007). IS application capabilities and relational value in interfirm partnerships. *Information Systems Research*, 18(3), 320-339.
- Schneider, B. (1983). Interactional psychology and organizational behavior. In L. Cummings & B. Staw (Eds.), *Research in organizational behavior* (pp. 1-31). Greenwich, CT: JAI Press.
- Sedikides, C., & Alicke, M. D. (2012). Self-enhancement and self-protection motives. In R. Ryan (Ed.), *The Oxford handbook of human motivation* (pp. 303-322). Oxford: Oxford University Press.
- Shah, S. K. (2006). Motivation, governance, and the viability of hybrid forms in open source software development. *Management Science*, 52(7), 1000-1014.
- Sicilia, M., & Palazón, M. (2008). Brand communities on the Internet: A case study of Coca-Cola's Spanish virtual community. *Corporate Communications: An International Journal*, 13(3), 255-270.
- Singh, A. K., & Singh, A. P. (2010). Role of stress and organizational support in predicting organizational citizenship behavior. *The IUP Journal of Organizational Behavior*, IX(4), 7-25.

- Sluss, D. M., Ployhart, R. E., Cobb, M. G., & Ashforth, B. E. (2012). Generalizing newcomer's relational and collective identifications: Processes and prototypicality. *Academy of Management Journal*, 55(4), 949-975.
- Sun, Y., Fang, Y., & Lim, K. H. (2012). Understanding sustained participation in transactional virtual communities. *Decision Support Systems*, 53(1), 12-22.
- Sutanto, J., Kankanhalli, A., & Tan, B. C. Y. (2011). Eliciting a sense of virtual community among knowledge contributors. *ACM Transactions on Management Information Systems*, 2(3).
- Svennevig, M. (2000). Needs, not nerds: Researching technological change. *International Journal of Advertising*, 19(5), 645-663.
- Thomson M., Macinnis, D. J., & Park, C. W. (2005). The ties that bind: Measuring the strength of consumers' emotional attachments to brands. *Journal of Consumer Psychology*, 15(1), 77-91.
- Tajfel, H. (1972). Experiments in a vacuum. in J. Israel & H. Tajfel (Eds.), *The context of social psychology: A critical assessment*. London: Academic Press.
- Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel & W. G. Austin (Eds.), *The psychology of intergroup relations* (pp. 7-24). Chicago: Nelson-Hall.
- Tsai, H. T., & Pai, P. (2014). Why do newcomers participate in virtual communities? An integration of self-determination and relationship management theories. *Decision Support Systems*, 57(1), 178-187.
- van Dick, R., Grojean, M. W., Christ, O., & Wieseke, J. (2006). Identity and the extra mile: Relationships between organizational identification and organizational citizenship behavior. *British Journal of Management*, 17, 283-301.
- van Knippenberg, D. (2000). Work motivation and performance: A social identity perspective. *Applied Psychology: An International Review*, 49, 357-371.
- Vlachos, P. A., Theotokis, A., Pramataris, K., & Vrechopoulos, A. (2010). Consumer-retailer emotional attachment: Some antecedents and the moderating role of attachment anxiety. *European Journal of Marketing*, 44(9/10), 1478-1499.
- Wasko, M. M., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly*, 29(1), 35-57.
- Wasko, M. M., Faraj, S., & Teigland, R. (2004). Collective action and knowledge contribution in electronic networks of practice. *Journal of the Association for Information Systems*, 5(11), 493-513.
- Williams, L. J., & Anderson, S. E. (1991). Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management*, 17(3), 601-617.
- Xu, B., Li, D., & Shao, B. (2012). Knowledge sharing in virtual communities: A study of citizenship behavior and its social-relational antecedents. *International Journal of Human-Computer Interaction*, 28(5), 347-359.
- Yong, L., Sachau, D., & Lassiter, A. (2011). Developing a measure of virtual community citizenship behavior. *Knowledge Management and E-Learning: An International Journal*, 3(4), 682-696.
- Yu, J., Jiang, Z., & Chan, H. (2011). The influence of socio-technological mechanisms on individual motivation towards knowledge contribution in problem-solving virtual communities. *IEEE Transactions on Professional Communication*, 54(2), 152-167.
- Zhao, L., Lu, Y., Wang, B., Chau, P. Y. K., & Zhang, L. (2012). Cultivating the sense of belonging and motivating user participation in virtual communities: A social capital perspective. *International Journal of Information Management*, 32(6), 574-588.
- Zhang, C., Hahn, J., & De, P. (2013). Continued participation in online innovation communities: Does community response matter equally for everyone? *Information Systems Research*, 24(4), 1112-1130.

## Appendices

### Appendix A: Questionnaire Items

**Table A-1. Questionnaire Items**

**Knowledge-sharing efficacy (KS) (Kankanhalli et al., 2005)**

KS1	I have confidence in my ability to provide knowledge that others in this VC consider valuable.
KS2	I have the expertise needed to provide valuable knowledge for this VC.
KS3	I believe that my contribution is helpful to the knowledge other members are likely to share in this VC.
KS4	I can contribute valuable knowledge as did most other members of this VC.

**Self-reflection learning (SL) (Nelson Laird, Shoup, & Kuh, 2005; Santos & Hammond, 2007)**

SL1	By sharing knowledge in this VC, I could discuss issues with the subject matter experts inside the VC.
SL2	By online discussion with other members of this VC, I learned some knowledge or skills from other members.
SL3	By online discussion with other members of this VC, I developed new ideas or thoughts on some topics.
SL4	Feedback from members of this VC to the questions or knowledge I posted improved my understanding of a topic or issue.

**Solitary playfulness (Ball-Rokeach et al., 1984; Conway & Rubin, 1991)**

SIP1	Reading and posting information or knowledge in this VC is a way to relax myself.
SIP2	Reading and posting information or knowledge in this VC amuses me.
SIP3	Reading and posting information or knowledge in this VC is interesting.
SIP4	Reading and posting information or knowledge in this VC makes me feel like I am in my own universe.

**Social playfulness (McQuail, Blumler, & Brown, 1972; Svennevig, 2000)**

SOP1	Participating in this VC give me opportunities to know new friends.
SOP2	Participating in this VC allows me to have fun with other members.
SOP3	Having social interaction with other members in this VC is interesting.
SOP4	Making a friendly interaction with other members in this VC is pleasant.

**Self-esteem enhancement (Rosenberg, 1965)**

SEE1	I feel that I have a number of good qualities by sharing knowledge in the VC.
SEE2	I feel that I am able to do things as well as most other people by sharing knowledge in the VC.
SEE3	I feel that I am a person of worth by sharing knowledge in the VC, at least on an equal plane with others.
SEE4	I feel that I am competent by sharing knowledge in the VC.

**Table A-1. Questionnaire Items (cont.)****Social enhancement (Wasko & Faraj, 2005)**

SOE1	<i>I earn respect from other members by sharing knowledge in the VC.</i>
SOE2	<i>I feel that sharing knowledge in the VC enhances my status in the profession.</i>
SOE3	<i>I feel that sharing knowledge in the VC enhances my reputation in the profession.</i>
SOE4	<i>I gain approval from other members by sharing knowledge in the VC.</i>

**Virtual community attachment (Jorgensen & Stedman, 2006; Allen & Mayer, 1990)**

VCA1	<i>This VC is important to me.</i>
VCA2	<i>I identify strongly with this VC.</i>
VCA3	<i>I really miss the VC when I am away from it for too long.</i>
VCA4	<i>I feel emotionally attached to this VC.</i>

**Satisfaction (Kim et al., 2007)**

SA1	<i>I like to share knowledge with others in the VC.</i>
SA2	<i>My decision to share knowledge with others in the VC is a wise one.</i>
SA3	<i>I am satisfied with the experience of sharing knowledge with others in the VC.</i>

**VCCBC (Lee & Allen, 2002; Podsakoff et al., 1990)**

VCCBV1	<i>I defend the VC when other members criticize it.</i>
VCCBC2	<i>I offer opinions or ideas that improve the functioning of the VC.</i>
VCCBC3	<i>I express loyalty toward the VC.</i>
VCCBC4	<i>I take action to protect the VC from potential problems.</i>

**VCCBI (Lee & Allen, 2002; Podsakoff et al., 1990)**

VCCBI1	<i>I share personal experiences with other community members to help them.</i>
VCCBI2	<i>I show genuine courtesy towards other members, even under difficult or annoying personal situations.</i>
VCCBI3	<i>I try to avoid creating problems for other members of this VC.</i>
VCCBI4	<i>I do not abuse the rights of other members of this virtual community.</i>

## Appendix B: Exploratory Factor Analysis

Table B-1. Exploratory Factor Analysis

	VCA	KSE	SA	SEE	SIP	SRL	SOE	SOP	VCCBI	VCCBC	Cronbach's alpha
VCA1	<b>0.65</b>	0.14	0.30	0.15	0.12	0.20	0.21	0.24	0.15	0.13	0.90
VCA2	<b>0.70</b>	0.20	0.14	0.12	0.15	0.12	0.30	0.15	0.26	0.24	
VCA3	<b>0.79</b>	0.12	0.04	0.16	0.18	0.08	0.14	0.11	0.14	0.26	
VCA4	<b>0.65</b>	0.13	0.10	0.20	0.16	0.03	0.27	0.18	0.10	0.44	
KSE1	0.10	<b>0.86</b>	0.08	0.15	0.11	0.10	0.08	0.05	0.12	0.00	0.93
KSE2	0.02	<b>0.89</b>	0.11	0.10	0.10	0.12	0.09	-0.01	0.13	0.07	
KSE3	0.12	<b>0.86</b>	-0.01	0.12	0.05	0.12	0.12	0.07	0.18	0.05	
KSE4	0.14	<b>0.87</b>	0.13	0.11	0.04	0.11	0.05	0.06	0.14	0.02	
SA1	0.15	0.25	<b>0.63</b>	0.14	0.10	0.15	0.27	0.26	0.33	0.22	0.91
SA2	0.21	0.18	<b>0.66</b>	0.19	0.22	0.18	0.29	0.24	0.23	0.18	
SA3	0.26	0.21	<b>0.62</b>	0.22	0.28	0.20	0.15	0.21	0.23	0.21	
SEE1	0.09	0.22	0.17	<b>0.71</b>	0.28	0.12	0.21	0.23	0.09	0.10	0.92
SEE2	0.15	0.19	0.06	<b>0.75</b>	0.16	0.08	0.24	0.10	0.15	0.30	
SEE3	0.26	0.12	0.08	<b>0.74</b>	0.16	0.22	0.28	0.20	0.18	0.12	
SEE4	0.11	0.20	0.11	<b>0.74</b>	0.25	0.21	0.22	0.15	0.11	0.10	
SIP1	0.09	0.05	0.09	0.30	<b>0.66</b>	0.18	0.16	0.30	-0.06	0.11	0.86
SIP2	0.22	0.15	0.20	0.23	<b>0.73</b>	0.20	0.12	0.17	0.13	0.04	
SIP3	0.10	0.16	0.05	0.12	<b>0.80</b>	0.16	0.11	0.15	0.23	0.13	
SIP4	0.16	0.01	0.08	0.19	<b>0.64</b>	0.06	0.22	0.11	0.11	0.41	
SRL1	0.02	0.22	0.17	0.18	0.01	<b>0.71</b>	0.23	-0.05	0.06	0.30	0.88
SRL2	0.05	0.19	0.08	0.08	0.12	<b>0.79</b>	0.11	-0.02	0.28	0.09	
SRL3	0.06	0.08	0.15	0.08	0.23	<b>0.82</b>	0.06	0.14	0.21	0.16	
SRL4	0.20	0.09	-0.05	0.18	0.16	<b>0.79</b>	0.05	0.20	0.18	0.07	
SOE1	0.31	0.16	0.13	0.28	0.12	0.10	<b>0.63</b>	0.25	0.13	0.18	0.91
SOE2	0.19	0.11	0.12	0.24	0.11	0.17	<b>0.76</b>	0.16	0.09	0.18	
SOE3	0.19	0.12	0.17	0.21	0.19	0.05	<b>0.78</b>	0.15	0.07	0.20	
SOE4	0.15	0.11	0.10	0.27	0.22	0.21	<b>0.67</b>	0.30	0.18	0.13	
SOP1	0.13	0.05	0.06	0.19	0.16	0.09	0.19	<b>0.75</b>	0.21	0.26	0.93
SOP2	0.17	0.02	0.13	0.23	0.22	0.07	0.21	<b>0.77</b>	0.06	0.30	
SOP3	0.12	0.06	0.23	0.15	0.28	0.08	0.24	<b>0.69</b>	0.19	0.32	
SOP4	0.23	0.09	0.18	0.10	0.17	0.08	0.19	<b>0.69</b>	0.36	0.23	
VCCBI1	0.15	0.27	0.19	0.17	0.10	0.31	0.15	0.09	<b>0.60</b>	0.19	0.86
VCCBI2	0.09	0.15	0.01	0.05	0.14	0.08	0.18	0.11	<b>0.82</b>	0.12	
VCCBI3	0.16	0.13	0.20	0.09	0.04	0.23	0.06	0.11	<b>0.75</b>	0.03	
VCCBI4	0.10	0.19	0.10	0.14	0.10	0.23	-0.02	0.24	<b>0.74</b>	0.02	
VCCBC1	0.10	-0.04	0.11	0.13	0.22	0.12	0.27	0.18	0.02	<b>0.73</b>	0.89
VCCBC2	0.13	0.13	0.16	0.13	0.06	0.15	0.04	0.14	0.05	<b>0.81</b>	
VCCBC3	0.29	0.03	0.01	0.01	0.07	0.13	0.20	0.26	0.14	<b>0.73</b>	
VCCBC4	0.19	0.01	0.07	0.16	0.12	0.16	0.07	0.23	0.10	<b>0.80</b>	
<p>Legend: VCA = virtual community attachment  SA = satisfaction  SIP = solitary playfulness  SOE = social enhancement  VCCBI = VCCB toward individuals</p> <p>KSE = knowledge-sharing efficacy  SEE = self-esteem enhancement  SRL = self-reflection learning  SOP = social playfulness  VCCBC = VCCB toward community</p>											



## Appendix C: Loadings and Cross-Loadings

Table C-1. Loadings and Cross-Loadings

	VCA	KSE	SA	SEE	SIP	SRL	SOE	SOP	VCCBI	VCCBC
VCA1	<b>0.85</b>	0.34	0.61	0.51	0.47	0.42	0.58	0.55	0.47	0.48
VCA2	<b>0.92</b>	0.39	0.61	0.52	0.50	0.41	0.63	0.55	0.54	0.54
VCA3	<b>0.87</b>	0.30	0.51	0.47	0.47	0.33	0.52	0.47	0.40	0.51
VCA4	<b>0.89</b>	0.31	0.58	0.55	0.51	0.34	0.63	0.59	0.41	0.67
KSE1	0.34	<b>0.90</b>	0.42	0.41	0.30	0.32	0.33	0.22	0.40	0.15
KSE2	0.30	<b>0.92</b>	0.42	0.37	0.28	0.34	0.32	0.19	0.40	0.16
KSE3	0.37	<b>0.91</b>	0.41	0.40	0.28	0.35	0.35	0.25	0.44	0.19
KSE4	0.37	<b>0.92</b>	0.44	0.38	0.26	0.33	0.31	0.23	0.42	0.16
SA1	0.57	0.45	<b>0.91</b>	0.52	0.48	0.46	0.61	0.62	0.61	0.47
SA2	0.61	0.40	<b>0.93</b>	0.57	0.56	0.47	0.65	0.62	0.56	0.48
SA3	0.63	0.43	<b>0.92</b>	0.60	0.60	0.50	0.57	0.60	0.55	0.50
SEE1	0.48	0.41	0.56	<b>0.88</b>	0.60	0.40	0.60	0.53	0.39	0.38
SEE2	0.54	0.38	0.52	<b>0.89</b>	0.53	0.39	0.61	0.50	0.41	0.48
SEE3	0.59	0.35	0.58	<b>0.92</b>	0.57	0.49	0.68	0.55	0.48	0.43
SEE4	0.47	0.40	0.54	<b>0.89</b>	0.57	0.46	0.60	0.48	0.41	0.38
SIP1	0.41	0.21	0.44	0.55	<b>0.81</b>	0.38	0.49	0.53	0.26	0.38
SIP2	0.51	0.32	0.56	0.57	<b>0.88</b>	0.45	0.49	0.52	0.42	0.35
SIP3	0.42	0.32	0.49	0.49	<b>0.86</b>	0.42	0.44	0.49	0.43	0.38
SIP4	0.52	0.18	0.49	0.52	<b>0.82</b>	0.35	0.51	0.54	0.34	0.54
SRL1	0.37	0.36	0.44	0.44	0.35	<b>0.82</b>	0.43	0.28	0.41	0.43
SRL2	0.33	0.36	0.43	0.38	0.36	<b>0.87</b>	0.34	0.26	0.53	0.30
SRL3	0.37	0.28	0.51	0.42	0.48	<b>0.91</b>	0.38	0.39	0.52	0.41
SRL4	0.41	0.28	0.42	0.45	0.44	<b>0.87</b>	0.38	0.40	0.49	0.35
SOE1	0.65	0.35	0.61	0.63	0.51	0.38	<b>0.88</b>	0.60	0.43	0.49
SOE2	0.57	0.30	0.56	0.59	0.46	0.40	<b>0.88</b>	0.52	0.37	0.46
SOE3	0.59	0.30	0.58	0.59	0.51	0.33	<b>0.90</b>	0.53	0.35	0.46
SOE4	0.58	0.32	0.60	0.65	0.56	0.46	<b>0.89</b>	0.63	0.46	0.46
SOP1	0.51	0.20	0.54	0.51	0.51	0.34	0.54	<b>0.88</b>	0.45	0.53
SOP2	0.56	0.18	0.58	0.55	0.57	0.32	0.60	<b>0.92</b>	0.37	0.59
SOP3	0.56	0.23	0.65	0.53	0.61	0.37	0.61	<b>0.92</b>	0.47	0.61
SOP4	0.60	0.27	0.64	0.50	0.54	0.37	0.58	<b>0.90</b>	0.59	0.55
VCCBI1	0.51	0.46	0.61	0.48	0.43	0.58	0.46	0.47	<b>0.84</b>	0.37
VCCBI2	0.41	0.33	0.48	0.35	0.35	0.37	0.38	0.42	<b>0.83</b>	0.29
VCCBI3	0.41	0.34	0.50	0.35	0.31	0.45	0.34	0.40	<b>0.85</b>	0.25
VCCBI4	0.38	0.38	0.48	0.39	0.35	0.46	0.33	0.45	<b>0.84</b>	0.26
VCCBC1	0.52	0.10	0.45	0.44	0.48	0.35	0.51	0.55	0.26	<b>0.85</b>
VCCBC2	0.50	0.23	0.44	0.38	0.39	0.38	0.40	0.49	0.30	<b>0.86</b>
VCCBC3	0.60	0.16	0.46	0.37	0.39	0.36	0.49	0.58	0.33	<b>0.87</b>
VCCBC4	0.55	0.15	0.47	0.43	0.45	0.40	0.45	0.57	0.33	<b>0.90</b>

Legend: VCA = virtual community attachment  
SA = satisfaction  
SIP = solitary playfulness  
SOE = social enhancement  
VCCBI = VCCB toward individuals

KSE = knowledge-sharing efficacy  
SEE = self-esteem enhancement  
SRL = self-reflection learning  
SOP = social playfulness  
VCCBC = VCCB toward community

## Appendix D: Testing for Common Method Bias and Multicollinearity

We checked for the common method bias (CMB) in three steps. First, we performed Harman's one-factor test. Evidence for CMB exists when 1) a single factor emerges from exploratory factor analysis (unrotated) or 2) one general factor accounts for the majority of the covariance of the variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 889). We entered all the variables into an exploratory factor analysis by using unrotated principal components factor analysis and forcing to extract one factor. The merged factor accounted for less than 50 percent of the variance (43.63%), implying that CMB is not substantial. In addition, the rotated solution of the exploratory factor analysis showed that each principal factor explained roughly equal amounts of variance (4.72%~9.72%), further suggesting the lack of CMB. Second, the correlation matrix (Table 5) shows that all correlations were below 0.70, while CMB is evidenced by extremely high correlations ( $r > 0.90$ ) (Bagozzi, Yi, & Phillips, 1991).

Third, we assessed the possibility of a CMB was by including a latent method factor in the structural model using a PLS approach documented in the IS literature (Saraf, Langdon, & Gosain, 2007). Each indicator in the structural model is specified to be determined by its substantive (theoretical) construct, the method factor, and measurement error. However, SmartPLS neither accommodates random errors nor allows an indicator to be determined by more than one construct. To overcome these constraints, we converted each indicator into a single-indicator construct as Saraf et al. (2007) suggest. As a result, all the research constructs and the method factor became second-order constructs, except for enabling the self, gratifying the self, and enriching the self (a third-order construct). We then constructed a SmartPLS model with the method factor linking to all the single-indicator constructs converted from the observed indicators. For each single-indicator construct, we examined the coefficients of the incoming paths from its substantive construct and the method factor. These two path coefficients are equivalent to an observed indicator's loadings on its substantive construct and the method factor and can be used to assess common method bias (Saraf et al., 2007). According to Saraf et al. (2007), the squared values of the method factor loadings are interpreted as the percentage of indicator variances caused by the method, whereas the squared loadings of the substantive constructs are interpreted as the percentage of the indicator variances caused by the substantive constructs. Common method bias is unlikely to be a serious concern if the following two criteria are fulfilled: 1) the method factor loadings are insignificant, and 2) the indicators' substantive variances are substantially greater than their method variances. As Table D-1 shows, 36 of 39 method factor loadings were insignificant and all of the indicators' substantive variances were substantially greater than their method variances. These findings indicate that common method bias should not be a serious problem with regard to our data.

We used variance inflation factors (VIF) to assess the degree of multicollinearity. We conducted a regression analysis by modeling VCCBI as the dependent variable and the other eleven variables as the independent variables. The VIFs ranged from 1.425 and 2.743, all below the suggested threshold of 3.3 (Diamantopoulos & Siguaw, 2006). Therefore, no significant multicollinearity problem exists with regard to our data.

**Table D-1. Common Method Bias Analysis**

	Items	Substantive factor loading ( $R_1$ )	Substantive variance ( $R_1^2$ )	T-statistics	Method factor loading ( $R_2$ )	Method variance ( $R_2^2$ )	T-statistics
Self-reflection learning	SL1	0.780	0.608	<b>14.928</b>	0.046	0.002	0.792
	SL2	0.930	0.865	<b>27.354</b>	-0.080	0.006	1.801
	SL3	0.900	0.810	<b>28.740</b>	0.012	0.000	0.274
	SL4	0.848	0.719	<b>16.531</b>	0.026	0.001	0.519
Knowledge-sharing efficacy	KS1	0.903	0.815	<b>29.110</b>	0.004	0.000	0.097
	KS2	0.941	0.885	<b>49.543</b>	-0.032	0.001	0.899
	KS3	0.898	0.806	<b>27.690</b>	0.028	0.001	0.668
	KS4	0.914	0.835	<b>28.285</b>	-0.001	0.000	0.008
Solitary playfulness	SIP1	0.853	0.728	<b>11.414</b>	-0.043	0.002	0.600
	SIP2	0.860	0.740	<b>15.605</b>	0.024	0.001	0.383
	SIP3	0.906	0.821	<b>17.384</b>	-0.059	0.003	0.842
	SIP4	0.746	0.557	<b>9.206</b>	0.080	0.006	0.903
Social playfulness	SOP1	0.951	0.904	<b>15.314</b>	-0.078	0.006	1.113
	SOP2	0.984	0.968	<b>25.301</b>	-0.071	0.005	1.476
	SOP3	0.875	0.766	<b>18.347</b>	0.057	0.003	1.022
	SOP4	0.821	0.674	<b>15.542</b>	0.092	0.008	1.585
Self-esteem enhancement	SEE1	0.891	0.794	<b>15.772</b>	-0.009	0.000	0.151
	SEE2	0.916	0.839	<b>20.276</b>	-0.026	0.001	0.493
	SEE3	0.857	0.734	<b>18.933</b>	0.076	0.006	1.411
	SEE4	0.926	0.857	<b>17.661</b>	-0.044	0.002	0.755
Social enhancement	SOE1	0.801	0.642	<b>11.570</b>	0.094	0.009	1.259
	SOE2	0.941	0.885	<b>17.602</b>	-0.077	0.006	1.306
	SOE3	1.000	1.000	<b>22.995</b>	-0.120	0.014	<b>2.209</b>
	SOE4	0.804	0.646	<b>14.694</b>	0.103	0.011	1.633
Virtual community attachment	CA1	0.792	0.627	<b>13.631</b>	0.069	0.005	1.130
	CA2	0.884	0.781	<b>20.655</b>	0.037	0.001	0.736
	CA3	1.002	1.004	<b>21.864</b>	-0.158	0.025	<b>2.880</b>
	CA4	0.855	0.731	<b>18.923</b>	0.047	0.002	0.894
Satisfaction	SA1	0.943	0.889	<b>18.995</b>	-0.039	0.002	0.683
	SA2	0.927	0.859	<b>20.108</b>	0.004	0.000	0.078
	SA3	0.890	0.792	<b>18.242</b>	0.034	0.001	0.632
VCCBC	VCCBC1	0.825	0.681	<b>17.322</b>	0.031	0.001	0.598
	VCCBC2	0.899	0.808	<b>20.533</b>	-0.049	0.002	0.920
	VCCBC3	0.846	0.716	<b>17.202</b>	0.024	0.001	0.444
	VCCBC4	0.907	0.823	<b>28.322</b>	-0.006	0.000	0.140
VCCBI	VCCBI1	0.665	0.442	<b>12.740</b>	0.220	0.048	<b>3.672</b>
	VCCBI2	0.886	0.785	<b>18.260</b>	-0.066	0.004	1.037
	VCCBI3	0.919	0.845	<b>19.178</b>	-0.093	0.009	1.626
	VCCBI4	0.890	0.792	<b>20.284</b>	-0.059	0.003	1.093

Note: the t-statistics in bold are significant, p-value < .05.

## Appendix E: Validation of Second-Order Formative Constructs

We assessed the validity of treating enabling the self, gratifying the self, and enriching the self as second-order, formative constructs based on formative measurement guidelines by 1) assessing multicollinearity among the first-order constructs and 2) examining the path weights and correlations among the first-order constructs and the second-order construct (Cenfetelli & Bassellier, 2009; Petter, Straub, & Rai, 2007). Variance inflation factor (VIF) values for the formative dimensions of enabling the self, gratifying the self, and enriching the self ranged from 1.16 to 1.92, well below the threshold of 3.3 (Diamantopoulos & Siguaw, 2006), indicating no serious concerns with multicollinearity in the data. Second, all path weights between the first-order constructs and the second-order constructs were significant (see Figure 2). The bivariate correlations between enabling the self and self-reflection learning and knowledge sharing efficacy were 0.80 and 0.86, respectively. The bivariate correlations between gratifying the self and solitary playfulness and social playfulness were 0.88 and 0.92, respectively. The bivariate correlations between enriching the self and self-esteem enhancement and social enhancement were 0.92 and 0.92, respectively. Overall, these correlations have demonstrated very strong absolute relationships between the first-order constructs and the second-order ones.

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