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THE DECISION TO CONTINUE SHARING KNOWLEDGE IN VIRTUAL COMMUNITIES: THE MODERATING ROLE OF KNOWLEDGE-SHARING EXPERIENCE AND KNOWLEDGE SELF-EFFICACY

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Abstract

Virtual communities have become increasingly popular in recent years. Despite significant growth in the number of virtual communities, few communities have been successful retaining members and motivating members to continue sharing knowledge. This study focuses on how knowledge-contributor characteristics impact the relationship between individuals' community-involvement motivation and continued knowledge-sharing intention. According to the study's online survey of 292 knowledge contributors in two professional virtual communities (PVCs), knowledge-sharing experience and knowledge self-efficacy – two contributor characteristics – moderate the relationship between motivational factors and continued knowledge sharing. Specifically, reputation and enjoyment in helping others had a stronger influence on knowledge contributors with high knowledge self-efficacy, whereas reciprocity had a stronger influence on knowledge contributors with low knowledge self-efficacy. Furthermore, reciprocity and moral obligation had a stronger influence on knowledge contributors with high knowledge-sharing experience. The results of this study provide important implications for research and practice.

Keywords: Virtual communities; Community involvement; Individual motivation; Continued knowledge sharing.

1 INTRODUCTION

Virtual communities have become increasingly popular in recent years, primarily because they can provide members emotional support and entertainment, as well as facilitate business activities (Phang et al. 2009). Members can also use communities for knowledge seeking and sharing (Phang et al. 2009) and as hubs for social and information networking (Valck et al. 2009). Despite significant growth in the number of virtual communities, few communities have been successful retaining members and motivating members to contribute knowledge (Ma & Agarwal 2007).

This study aims to address three research gaps in prior research on knowledge sharing in virtual communities. First, prior research has identified that extrinsic and intrinsic motivations drive knowledge sharing (Chang & Chuang 2011; Marett & Joshi 2009). However, initial motivation may change over time (Batson et al. 2002); thus, it may not adequately explain sustained participation (Sun et al. 2012). Furthermore, encouraging continued participation may not translate into members' willingness to continue sharing knowledge. Although understanding initial motivation for knowledge sharing is important, continued knowledge sharing is a key measure of a virtual community's ultimate success. Second, there are different perspectives of knowledge, such as knowledge as object, knowledge embedded in individuals, and knowledge embedded in a community (Wasko & Faraj 2000). The motivators for exchanging each type of knowledge are different (Wasko & Faraj 2000). In our study, knowledge contributors viewed knowledge as a private good owned by the individual and as a public good free to all members. Third, motivations are reasons people take certain actions (Lu et al. 2011). Previous studies have not clarified how knowledge-contributor characteristics and community-involvement motivation interact in determining continued knowledge sharing. For instance, an individual with high community-involvement motivation may choose not to share knowledge because of lack of ability or prior experience. Accordingly, it is important to understand the role of knowledge-sharing experience and knowledge self-efficacy in determining individuals' continuance intention of knowledge sharing.

This study focuses on understanding individual community-involvement motivation in continued knowledge contribution in virtual communities by drawing on the perspectives of knowledge as a private good and a public good and considering two knowledge-contributor characteristics: knowledge-sharing experience and knowledge self-efficacy. This study proposes that knowledge-sharing experience and knowledge self-efficacy moderate the relationship between community-involvement motivation (reputation, reciprocity, moral obligation, and enjoyment in helping others) and continued knowledge-sharing behavior.

2 LITERATURE REVIEW

2.1 Knowledge as a Private Good vs. Knowledge as a Public Good

Prior research suggests there are two main perspectives of knowledge sharing: (1) knowledge embedded in people and knowledge as a private good, and (2) knowledge embedded in a community and knowledge as a public good (Wasko & Faraj 2000). The first perspective assumes human behavior is ultimately directed toward self-interest (Campbell 1975), or is egoistic (Batson 1994). A motive is egoistic if the ultimate goal is to benefit one's own welfare (Batson 1994; Batson et al. 2002). For example, the Social Exchange Theory (SET) indicates that human behavior is not always rational; in the process of social exchange, the individual evaluates costs and benefits with the purpose of cost minimization and self-benefit maximization (Molm 1997). Thus, self-interest motivates the decision to share knowledge; an individual is less likely to exchange knowledge if the exchange will not provide tangible returns, such as economic reward, or intangible returns, such as reputation, status, or direct obligation from the knowledge seeker (Wasko & Faraj 2000). In the context of this study, self-interest motives refer to the benefit of one's own welfare, which include reputation and reciprocity.

The motivation to exchange knowledge goes beyond self-interest when perceiving knowledge as a public good (Wasko & Faraj 2000). People often behave altruistically and pro-socially to increase the welfare of a group or collective (Batson 1994; Batson et al. 2002; Wasko & Faraj 2000). When people see knowledge as a public good, a sense of moral obligation rather than an expectation of return motivates individuals to share their knowledge with others (Wasko & Faraj 2000, p. 156). In the context of this study, community-interest motives refer to the benefit of community welfare, which include moral obligation and enjoyment in helping others.

2.2 Knowledge Sharing in Virtual Communities

An ever-growing body of literature has identified factors influencing knowledge sharing in virtual communities. For instance, in studies on electronic networks of practice, Wasko and Faraj (2005) found people would contribute knowledge when they perceived that contribution enhanced their reputation, had experiences to share, and were centrally embedded in a network. In a study integrating social cognitive theory and social capital theory, Chiu et al. (2006) demonstrated that social interaction ties, trust, norms of reciprocity, identification, shared vision, shared language, community-related outcome expectations, and personal outcome expectations were all important motivations for knowledge contribution. Hsu et al. (2007), who integrated personal and environmental perspectives, found self-efficacy, outcome expectations, and multidimensional trust – including economy-based, information-based, and identification-based trust – influenced knowledge-sharing behavior in online communities. The study also demonstrated all three dimensions of trust had to exist concurrently to reinforce knowledge sharing among users. Ma and Agarwal (2007) reported that perceived identity verification was strongly linked to member satisfaction and knowledge contribution. In a study on multidimensional trust and knowledge-sharing behavior, Usoro et al. (2007) found that trust based on integrity, competence, and benevolence was positively related to the quantity (frequency), quality (usefulness or value), and focus (the degree to which an individual felt engaged in sharing) of knowledge sharing. Investigating the relationship between contextual factors, personal factors, knowledge-sharing behavior, and community loyalty in PVCs, Lin et al. (2009) found trust significantly affected knowledge-sharing self-efficacy, perceived relative advantage, and perceived compatibility – each of which positively affected knowledge-sharing behavior. In their study on PVCs, Chen and Hung (2010) similarly found that interpersonal trust, knowledge-sharing self-efficacy, and perceived relative advantage significantly affected knowledge contribution behavior. Tseng and Kuo (2010) revealed community identity, social awareness, and knowledge-sharing self-efficacy significantly impacted knowledge-sharing behavior; furthermore, social awareness and knowledge-sharing self-efficacy mediated the influence of interpersonal trust. Sun et al. (2012) examined the extrinsic and intrinsic motivations influencing people's sustained participation in a transactional virtual community with respect to two social learning factors – task complexity and self-efficacy. Sun et al. found extrinsic and intrinsic motivations significantly influenced sustained participation intention. They also observed a negative interaction between extrinsic motivation and task complexity, and a positive interaction between intrinsic motivation and self-efficacy.

2.3 Knowledge-Sharing Experience

This study defines knowledge-sharing experience as users' past experience contributing knowledge in a virtual community. Experience is an important moderating variable in information system usage contexts because individuals' reactions toward an information system may change over time (Karahanna et al. 1999). Prior studies suggest different motivations influence the information sharing behaviors of posters (who have more knowledge-sharing experience) and lurkers (who have less knowledge-sharing experience) (Marett & Joshi 2009; Preece et al. 2004). Results indicated intrinsic motivation (i.e., enjoying helping others) was a significant predictor of posters' sharing behaviors but did not significantly influence lurkers' sharing behavior. Thus, knowledge-sharing experience may have a moderating effect on the relationship between individual community-involvement motivation and knowledge-sharing behavior. In light of these findings, this study expect increased knowledge-

sharing experience will strengthen the effects of self-interest motivation and community-interest motivation on continued knowledge sharing.

2.4 Knowledge Self-Efficacy

Self-efficacy is the degree of confidence in one's ability to perform a task (Bandura 1977). Knowledge self-efficacy is the degree of confidence in one's ability to provide knowledge that is valuable to others (Kankanhalli et al. 2005; Spreitzer 1995). A person with high knowledge self-efficacy may believe answering questions is easy, especially novice questions (Wasko & Faraj 2000). Prior research suggests an individual with high knowledge self-efficacy will have powerful self-motivation (Bock & Kim 2002; Hsu et al. 2007); thus, such individuals may develop a more positive attitude toward knowledge sharing (Lin 2007). If an individual has a strong sense of knowledge self-efficacy, he or she will have no problem sharing (Kankanhalli et al. 2005).

3 RESEARCH MODEL AND HYPOTHESES

Figure 1 shows this study's research model. The following sections will summarize the research hypotheses.

3.1 Reputation

This study defines reputation as the perception of earning respect or enhancing status by contributing knowledge in virtual communities (Wasko & Faraj 2005). Previous research has indicated that building a reputation is a strong motivator for knowledge sharing (Davenport & Prusak 1998; Wasko & Faraj 2005). Systems can record other users' grading and contribution ranking for the knowledge posters have contributed (Ma & Agarwal 2007), thus potentially granting posters recognition as an expert (Ba et al. 2001). Posters with high knowledge-sharing experience can enhance their reputation by contributing more knowledge and improving their status and rankings based on others' evaluation and feedback. We expect experience will moderate the effect of reputation on continued knowledge-sharing intention, such that the effect will be stronger with increasing knowledge-sharing experience. Therefore, we propose:

H1a: Reputation has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge-sharing experience in a virtual community.

Knowledge self-efficacy is relevant to members' sense of confidence in their ability to solve a task (Constant et al. 1996). Viewing knowledge as a private good, extrinsic benefit should play an important role in driving knowledge exchange (Sun et al. 2012). Extrinsic benefit, such as reputation, can help an individual obtain and maintain his or her status in a community (Jones et al. 1997; Marett & Joshi 2009) because he or she wants others to see him or her as a knowledgeable person with valuable expertise (Davenport & Prusak 1998). Members fear losing their reputation if the community deems the shared content unreliable (Chang & Chuang 2011). Thus, we propose knowledge self-efficacy strengthens the relationship between reputation and continued knowledge-sharing intention. When knowledge self-efficacy is low, members feel less competent in continued knowledge contribution, leading to reputation's weakened influence on continued sharing. Thus, we hypothesize:

H1b: Reputation has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge self-efficacy in a virtual community.

3.2 Reciprocity

This study defines reciprocity as the perception that current knowledge-contribution behavior will lead to future requests for knowledge being met (Davenport & Prusak 1998). People who share knowledge online believe in reciprocity (Wasko & Faraj 2000). Online systems allow users to see feedback for and evaluations of their posted messages; such systems clearly demonstrate reciprocal benefit and can

also help users build reciprocal relationships with other members. We expect reciprocity's effect on continued knowledge-sharing intention will be stronger for people with high knowledge-sharing experience. Hence, we postulate:

H2a: Reciprocity has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge-sharing experience in a virtual community.

Viewing knowledge as a private good owned by an individual motivates individuals to share their knowledge with others for tangible and intangible returns. In such exchanges, reciprocity creates a perceived fairness that motivates knowledge-exchange behavior (Chang & Chuang 2011; Chiu et al. 2006). When viewing knowledge as knowledge embedded in people, knowledge sharing is only meaningful and actionable for those who are already knowledgeable (Wasko & Faraj 2000). Thus, when knowledge self-efficacy is high, members who perceive fairness may continue providing knowledge. However, when knowledge self-efficacy is low, members will feel less competent in continued knowledge contribution, leading to reciprocity's weak influence on continued knowledge-sharing intention. Hence, we postulate:

H2b: Reciprocity has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge self-efficacy in a virtual community.

3.3 Moral Obligation

A moral obligation is a duty or responsibility someone feels obligated to perform because of personal beliefs and values. Moral obligation motivates people who view knowledge as a public good to share more and work harder (Wasko & Faraj 2000). Moral obligation is derived from principlism, which refers to the motivation to uphold a universal and impartial moral principle (Batson 1994), and is a significant indicator of intention to engage in a behavior (Leonard et al. 2004). Individuals with a principled motivation share their knowledge for the public good (Batson et al. 2002), and are more likely to feel obliged to help others by sharing their knowledge (Cheung & Lee 2012). Prior research has indicated that the main reason lurkers do not post is that "just reading/browsing is enough" (Nonnecke et al. 2004). Lurkers may feel less obligated to help others. We expect that experience will moderate the effect of moral obligation on knowledge-sharing intention, such that the effect will be stronger with increasing knowledge-sharing experience. Hence, we hypothesize:

H3a: Moral obligation has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge-sharing experience in a virtual community.

When viewing knowledge as a public good, individuals believe everyone can use the shared knowledge, regardless of whether one has contributed to it (Wasko & Faraj 2000). People with moral obligations will dedicate their time and effort to the contribution of knowledge as a public good (Wasko & Faraj 2000). However, for those who feel they lack useful knowledge, moral obligation will have a weaker influence on knowledge-sharing intention. When knowledge self-efficacy is high, members are highly confident in their ability to provide valuable knowledge, and moral obligation should produce a stronger influence on continued knowledge-sharing intention. Thus, we hypothesize:

H3b: Moral obligation has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge self-efficacy in a virtual community.

3.4 Enjoyment in Helping Others

We define enjoyment in helping others as finding pleasure in helping others by sharing knowledge with a virtual community (Wasko & Faraj 2000). People often participate in community activities and help others because helping others brings satisfaction (Kollock 1999; Wasko & Faraj 2000). Previous research has indicated that an individual's enjoyment in helping others affects his or her attitude toward knowledge sharing (He & Wei 2009; Lin 2007). People with knowledge-sharing experience seem to find personal satisfaction in sharing knowledge; therefore, enjoyment and satisfaction in

sharing is a significant predictor of posters' information-sharing behaviors (Marett & Joshi 2009). We expect the effect of enjoyment in helping others on continued knowledge-sharing intention will become stronger when members have more knowledge-sharing experience. Accordingly, we propose:

H4a: Enjoyment in helping others has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge-sharing experience in a virtual community.

Individuals who enjoy helping others and have a high level of knowledge self-efficacy may contribute more easily than people with low levels of knowledge self-efficacy do when topics are complex. We propose that when perceived knowledge self-efficacy is low, enjoyment in helping others has a weaker impact on continued knowledge-sharing intention. Therefore, we hypothesize:

H4b: Enjoyment in helping others has a stronger positive effect on continued knowledge-sharing intention when members have a high level of knowledge self-efficacy in a virtual community.

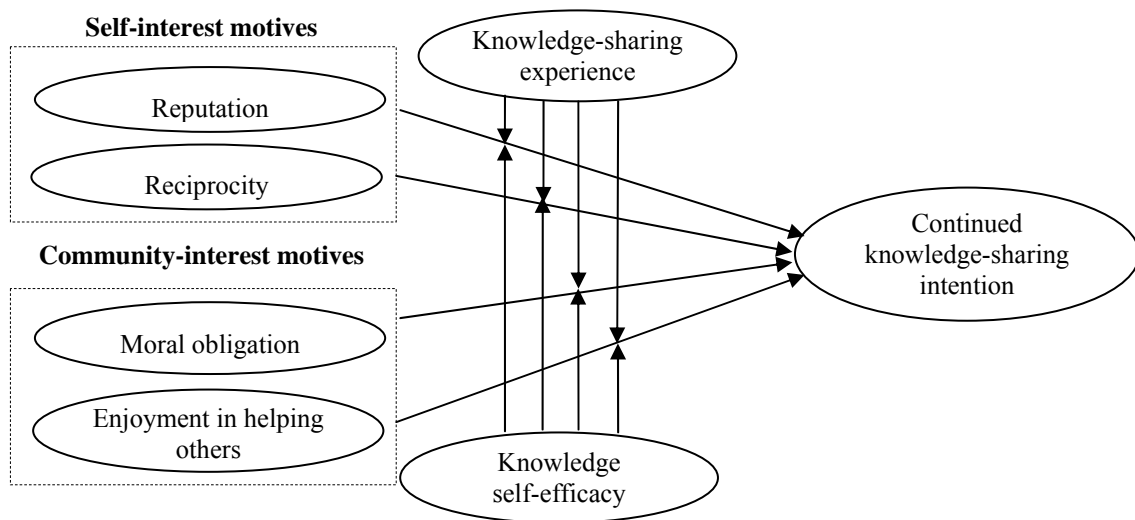


Figure 1. The research model.

4 RESEARCH METHODOLOGY

4.1 Data Collection

We collected empirical data by conducting an online survey of two PVCs in Taiwan. Two of the largest programming virtual communities in Taiwan are JavaWorld, with 149,000 members, and BlueShop, with 223,000 members. These virtual communities host knowledge sharing, knowledge seeking, technical discussions, employment searches, and file uploading. Bulletin boards for both communities announced the study, stated the study's purpose, and provided a hyperlink to our survey. We invited members with knowledge-sharing experience who had been registered for over 1 month to complete the survey. The virtual community administrators encouraged members to participate.

The online survey received 292 usable responses, and 11 members received \$7(US) in cash prizes. Table 1 summarizes the respondents' demographic profile. The sample consisted of 245 males (83.9%) and 47 females (16.1%). With respect to age, most respondents were 21–30 (66.1%) or 31–40 (20.9%). Respondents who had been registered for over 3 months accounted for 89.7% of the sample, indicating that most respondents were familiar with this online community.

Demographic variable	Count (%)	Demographic variable	Count (%)
Gender		Education	

Male	245 (83.9%)	Under senior high school	1 (0.3%)
Female	47 (16.1%)	Senior high school	10 (3.4%)
Age		University or college	184 (63.0%)
20 years or below	20 (6.8%)	Graduate degree or above	97 (33.2%)
21–30 years	193 (66.1%)	Duration of membership	
31–40 years	61 (20.9%)	1 month–3 months	30 (10.3%)
41–50 years	15 (5.1%)	3 months–6 months	23 (7.9%)
51 years or above	3 (1.0%)	6 months–1 year	14 (4.8%)
		1 year–2 years	18 (6.2%)
		2 year–3 years	35 (12.0%)
		Over 3 years	172 (58.9%)

Table 1. Demographic information (N=292).

4.2 Measurement

To ensure content validity, we used items based on the validated construction measurements from prior research to measure each concept. We performed both a pretest and a pilot test to validate and refine the instrument. In the pretest, five information management experts checked the questionnaire. The pretest asked respondents to comment on the consistency of the English-Chinese translation, the instrument format, and ease of understanding. The pilot test then used this questionnaire for 32 community members. The formal survey began after the pilot test, which had tested and validated the research instruments and processes. The research model had seven constructs. Participants responded to questions using a 7-point Likert scale ranging from 1 for “strongly disagree” to 7 for “strongly agree”, except for those questions about knowledge-sharing experience.

The analysis included several control variables that may have influenced individual behavior, such as gender, age, education, and duration of membership.

5 RESULTS

We conducted data analysis in two stages. First, we estimated the measurement model to ensure the constructs possessed sufficient reliability and validity, and second, we tested the hypotheses using moderated multiple regression analysis (MMR) to test interaction effects. The existence of a significant interaction implied that the relationship between two variables changed depending on the level of a third variable (in our case, knowledge-sharing experience or knowledge self-efficacy).

5.1 Reliability and Validity

We assessed the constructs’ reliability and convergent validity using confirmatory factor analysis (CFA) in SmartPLS 2.0 software. CFA results revealed that loadings for SELF4 were lower than 0.5; the model excluded this item and later analysis did not consider it. After removal of this item, all factor loadings on their corresponding constructs were higher than the threshold of 0.5 recommended by Hair, Black, Babin, Anderson, and Tatham (2006). The results shown in Table 2 reveal that Cronbach’s alpha (CA), composite reliability (CR), and average variance extracted (AVE) for all the constructs exceeded the threshold values of 0.70, 0.70, and 0.50, respectively. Convergent validity exists when t-values of the outer model loadings are above 1.96, as suggested by Gefen and Straub (2005). Accordingly, all t-tests of factor loadings were significant, indicating sound convergent validity. Discriminant validity exists when item loadings on their respective constructs are higher than their loadings on other constructs and the square root of the AVE is greater than the inter-construct correlations, as suggested by Gefen and Straub (2005). Table 2 shows that the square roots of the AVE values were greater than the inter-construct correlations; thus, they exhibited sound discriminant validity. We also checked for multicollinearity because there were relatively high correlations between some variables (e.g., 0.544 between RECP and EH). The resulting variance inflation factor (VIF) values for all the constructs were acceptable (i.e., between 1.159 and 1.744).

Variables	Number of items*	CA	CR	1	2	3	4	5	6	7
1. REPU	3	0.780	0.872	0.834						
2. RECP	4	0.831	0.885	0.390	0.812					
3. MO	4	0.781	0.872	0.189	0.275	0.834				
4. EH	3	0.917	0.941	0.378	0.544	0.222	0.894			
5. EXP	1	n/a	n/a	0.159	0.019	-0.152	0.270	1.000		
6. SELF	3(4)	0.715	0.813	0.273	0.308	0.172	0.373	0.314	0.776	
7. CKSI	2	0.943	0.973	0.310	0.268	0.221	0.256	0.136	0.304	0.973

Table 2. Discriminant validity and reliability.

Notes: *Final item numbers (Initial item numbers). CR = Composite reliability and CA = Cronbach's alpha. The bold numbers in the diagonal row are square roots of the AVE. Notes: See Appendix A for the abbreviations used in Tables 2.

5.2 Hypotheses Testing

As previously mentioned, we tested the hypotheses by using MMR analysis to test interaction effects. We tested normality, multicollinearity, and residual autocorrelation for adequate use of the regression analysis, and used Z-skewness to test normality, VIF values to test multicollinearity, and Durbin-Watson statistics to test residual autocorrelation. When testing normality, Z-skewness/Z-kurtosis Test results demonstrated that all Z-values ranged from -2.58 to 2.58, except for the reciprocity variable. To reduce skewness, we transformed the reciprocity variable using a square transformation. Values of skewness and kurtosis for all the variables analyzed were then well-ranged from -2.58 to 2.58, indicating no significant departures from normality in the data. VIF values for all independent variables fell within the acceptable range, indicating there were no multicollinearity problems present. Likewise, the resulting Durbin-Watson Statistic of 2.168 indicated there were no auto-correlation problems.

The MMR analysis had two steps. In Step 1, we entered the control variables, independent variables, and moderating variables into Model 1. In Step 2, we added in the interaction terms computed by multiplying an independent variable and a moderating variable. We followed Cronbach's (1987) suggestion of using mean centering to alleviate collinearity problems in MMR models. Therefore, the values of all constructs in this study were centered (mean subtracted). As shown in Table 3, after we added the interaction terms into Model 2, the R^2 value of 0.269 and adjusted R^2 value of 0.221 ($F=5.583$, $p<0.001$) indicated that, overall, Model 2 adequately explained the variance of continued knowledge-sharing intention, which exceeded the acceptable value of 0.10 suggested by Falk and Miller (1992).

	DV: Continued knowledge-sharing intention					
	Model 1			Model 2		
	β	t-value	p-value	β	t-value	p-value
Control Variables						
Gender	0.017	0.297	0.767	0.017	0.311	0.756
Age	0.002	0.028	0.978	-0.018	-0.324	0.746
Education	-0.074	-1.337	0.182	-0.038	-0.712	0.477
Duration of membership	0.112	1.890	0.060	0.110	1.919	0.056
Independent Variables						
Reputation (REPU)	0.209	3.426	0.001	0.153	2.520	0.012
Reciprocity (RECP)	0.043	0.583	0.560	0.027	0.374	0.709
Moral obligation (MO)	0.156	2.646	0.009	0.154	2.625	0.009
Enjoyment in helping others (EH)	0.046	0.640	0.523	0.133	1.870	0.063
Moderators						
Knowledge-sharing experience (EXP)	0.058	0.930	0.353	0.052	0.866	0.387

Knowledge self-efficacy (SELF)	0.117	1.849	0.065	0.058	0.918	0.359
Interaction Terms						
REPU × EXP				-0.121	-1.800	0.073
REPU × SELF				0.157	2.287	0.023
RECP × EXP				0.235	3.495	0.001
RECP × SELF				-0.232	-3.257	0.001
MO × EXP				0.132	2.207	0.028
MO × SELF				-0.026	-0.444	0.658
EH × EXP				-0.007	-0.119	0.905
EH × SELF				0.153	2.186	0.030
R^2	0.173		0.269			
Adjusted R^2	0.144		0.221			
F	5.890		5.583			
P -value	0.000		0.000			
VIF range	1.04–1.80		1.07–1.90			

Table 3. Results of MMR analysis.

Table 4 summarizes the results of the hypotheses tests. The results did not support H1a, since the effect of the interaction terms of reputation and experience on continued knowledge-sharing intention was insignificant ($\beta = -0.121$, $p > 0.005$). However, the effect of the interaction terms of reputation and knowledge self-efficacy on continued knowledge-sharing intention was positive and significant ($\beta = 0.157$, $p < 0.05$), thus supporting H1b.

Supporting H2a, the effect of the interaction terms of reciprocity and experience on continued knowledge-sharing intention was positive and significant ($\beta = 0.235$, $p < 0.01$). However, the results did not support H2b, since the effect of the interaction terms of reciprocity and knowledge self-efficacy on continued knowledge-sharing intention was negative and significant ($\beta = -0.232$, $p < 0.01$).

Supporting H3a, the effect of the interaction terms of moral obligation and experience on continued knowledge-sharing intention was positive and significant ($\beta = 0.132$, $p < 0.05$). However, the effect of the interaction terms of moral obligation and knowledge self-efficacy on continued knowledge-sharing intention was insignificant ($\beta = -0.026$, $p > 0.05$), thus the results did not support H3b.

The results also did not support H4a, since the effect of the interaction terms of enjoyment in helping others and experience on continued knowledge-sharing intention was insignificant ($\beta = -0.007$, $p > 0.05$). However, the effect of the interaction terms of enjoyment in helping others and knowledge self-efficacy on continued knowledge-sharing intention was positive and significant ($\beta = 0.153$, $p < 0.05$), thus supporting H4b.

Hypothesis	β	Outcome
H1a: Reputation × Experience → Continued KS intention	-0.121	Not supported
H1b: Reputation × Knowledge Self-efficacy → Continued KS intention	0.157*	Supported
H2a: Reciprocity × Experience → Continued KS intention	0.235**	Supported
H2b: Reciprocity × Knowledge self-efficacy → Continued KS intention	-0.232**	Not supported (significant but in opposite direction)
H3a: Moral obligation × Experience → Continued KS intention	0.132*	Supported
H3b: Moral obligation × Knowledge self-efficacy → Continued KS intention	-0.026	Not supported
H4a: Enjoyment in helping others × Experience → Continued KS intention	-0.007	Not supported
H4b: Enjoyment in helping others × Knowledge self-efficacy → Continued KS intention	0.153*	Supported

Table 4. Results of the hypotheses tests.

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; β = standardized beta coefficient.

6 DISCUSSION AND IMPLICATIONS

6.1 Key Findings

Studies on the effects of individual motivation on knowledge sharing offer sound explanations for why people initially decide to share their knowledge in virtual communities. The majority of prior studies have focused on individual extrinsic (e.g., reputation), intrinsic (e.g., enjoyment in helping others), and social (e.g., trust, identification, reciprocity) motivational factors (Chang & Chuang 2011; Marett & Joshi 2009; Wasko & Faraj 2005). However, the initial motivation for sharing knowledge may not always lead to continued knowledge sharing. This study examines the moderating effect of knowledge-sharing experience and knowledge self-efficacy on the relationship between community-involvement motivation and continued knowledge-sharing behavior.

This study uncovered some interesting findings. First, the influence of reputation on continued knowledge-sharing intention was contingent on knowledge self-efficacy. As Figure 2 shows, when knowledge self-efficacy was high, reputation had a positive and significant influence on continuance intention. However, when knowledge self-efficacy was low, reputation had no effect on continuance intention.

Second, a positive and significant effect on continued knowledge-sharing intention suggests the influence of reciprocity on continued knowledge-sharing intention was stronger when contributors had more knowledge-sharing experience, as shown in Figure 3. Interestingly, the relationship between reciprocity and continued knowledge-sharing intention was stronger when contributors had low levels of knowledge self-efficacy, as shown in Figure 4. Our results also indicated expected reciprocity was a critical motivator of continued knowledge-sharing behavior for people with a low level of knowledge self-efficacy.

Third, the influence of moral obligation on continued knowledge-sharing intention was contingent on knowledge-sharing experience. This influence was stronger for individuals with more knowledge-sharing experience, as shown in Figure 5. However, we did not observe a significant interaction effect between moral obligation and knowledge self-efficacy.

Fourth, we observed a positive and significant relationship between enjoyment in helping others and knowledge self-efficacy, suggesting the effect of enjoyment in helping others on continued knowledge-sharing was stronger for contributors with high levels of knowledge self-efficacy, as shown in Figure 6.

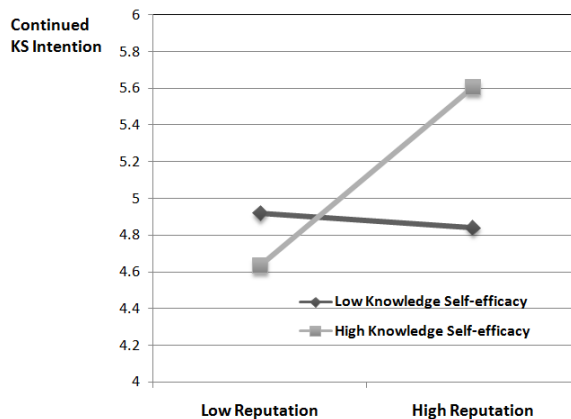


Figure 2. Moderating effect of knowledge self-efficacy in H1b.

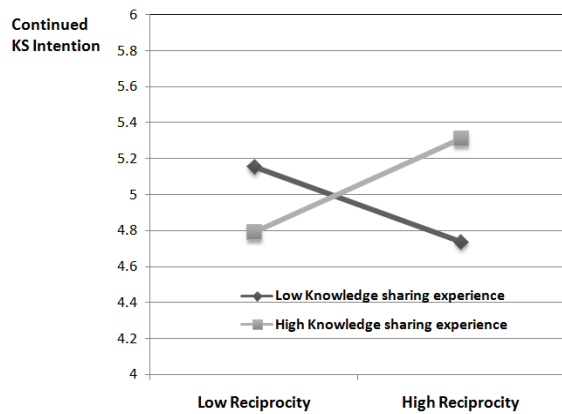


Figure 3. Moderating effect of knowledge-sharing experience in H2a.

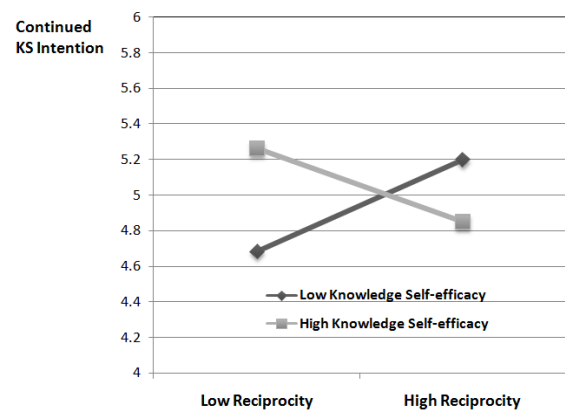


Figure 4. Moderating effect of knowledge self-efficacy in H2b.

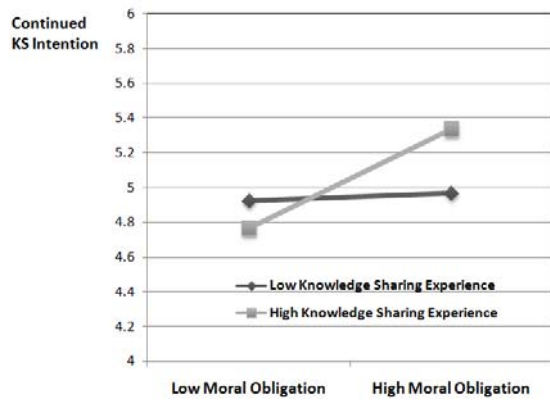


Figure 5. Moderating effect of knowledge-sharing experience in H3a.

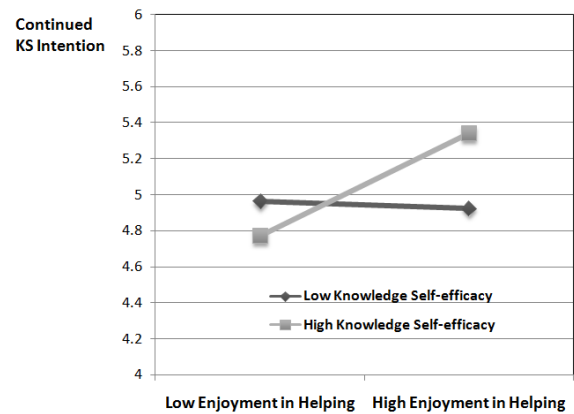


Figure 6. Moderating effect of knowledge self-efficacy in H4b.

6.2 Limitations

There are several limitations to this study. First, we only collected data from PVCs. Researchers may extend the external validity of this study by applying this research model to other types of virtual communities. Second, continued knowledge sharing in a virtual context may be more complex than this study captured. For example, a knowledge contributor's online privacy concerns may hinder his or her knowledge-sharing behavior (Chai et al. 2011-12). Size is another important factor in a community's ability to provide valuable benefits and, thus, increase ongoing community survival (Butler 2001; Koh et al. 2007). Future research should explore these issues further. Third, self-reported intention of continued knowledge sharing may not be as precise as intention obtained from actual behavioral data. However, Sheppard et al. (1988) reported that the correlation between intention and behavior is approximately 0.5, demonstrating that intention and behavior are highly correlated. Furthermore, collecting actual data from online communities is difficult because community members may use pseudonyms or different IDs. Fourth, the community-involvement motivations examined in this study undoubtedly have temporally dynamic relationships. Future research might adopt a longitudinal study to investigate the same variables over longer periods. Fifth, most of the data was from males. However, males were more likely to contribute knowledge in online communities (Phang

et al. 2009). Finally, social context factors that arise through interactions between knowledge contributors and knowledge seekers (e.g., knowledge-sharing norms and identification) may moderate the relationship between motivational factors and knowledge-sharing behavior (Kankanhalli et al. 2005). Therefore, future research might consider social context factors and explore how established norms and identification affect the community-involvement factors involved in continued knowledge sharing.

6.3 Theoretical Implications

This study makes several important contributions to the literature. First, prior researches on knowledge sharing primarily focus on initial motivation to participate in knowledge-sharing virtual communities (Chang & Chuang 2011; Chiu et al. 2006; Hsu et al. 2007; Phang et al. 2009). Given the voluntary social context, participation in virtual communities is unlikely sustainable unless properly stimulated (Koh et al. 2007; Lu et al. 2011). We sought to explore the community-involvement motivations that can encourage voluntary and continued knowledge-sharing behavior.

Second, this study demonstrates that researchers can better predict continued knowledge-sharing intention by understanding how community-involvement factors and contributor characteristics interact than by examining their impact separately. More specifically, we found that reciprocity alone had no influence on continued knowledge sharing, but its effects increased when the knowledge contributor had a high level of knowledge-sharing experience or a low level of knowledge self-efficacy. Furthermore, enjoyment in helping alone had rather weak influence on continued knowledge sharing, but its effects improved when the contributor had a high level of knowledge self-efficacy. These findings highlight the theoretical importance of integrating community-involvement factors and knowledge-contributor characteristics when studying continued knowledge-sharing behavior.

Finally, our findings imply that self-interested motivation and community-interested motivation had direct effects on continued knowledge-sharing intention. Results also revealed that reputation had a stronger influence on contributors with high levels of knowledge self-efficacy, whereas moral obligation had a stronger influence on contributors with more knowledge-sharing experience. These results help to explain continued knowledge-sharing behavior in virtual communities. Moreover, this study contributes to theory building by adopting two moderators to capture and differentiate initial motivation and continued motivation for knowledge sharing.

6.4 Practical Implications

This study makes several important contributions to practice. First, our findings suggest that reputation can motivate continued knowledge sharing and strongly influence knowledge contributors with high levels of knowledge self-efficacy. Community administrators can reinforce the motivating factor of reputation by creating knowledge-sharing ranking mechanisms that acknowledge members who actively share knowledge.

Second, community managers should acknowledge that moral obligation can motivate members to continue sharing knowledge when members view knowledge as a public good that a community owns and maintains. Furthermore, the relationship between moral obligation and continued knowledge sharing is stronger for contributors with more knowledge-sharing experience. Community moderators should establish a cultural norm that encourages contributors to continue sharing knowledge.

Finally, community managers should recognize that enjoyment in helping others strongly influences continued knowledge sharing for contributors with high levels of knowledge self-efficacy, whereas reciprocity has a stronger influence on contributors with less knowledge self-efficacy and is essential for stimulating their continued knowledge-sharing intention. According to Fehr and Gächter (2000), reciprocity is deeply embedded in social interactions. Making it easier for members to interact with others through the community system can promote participation in intellectual discourses with other members (Phang et al. 2009).

7 CONCLUSION

This study presents an important step in building a theory to understand continued knowledge sharing in virtual communities by integrating perspectives of knowledge as a private good and a public good and adopting two moderating variables to analyze the relationship between community-involvement motivation and continued sharing knowledge. According to our findings, reputation and enjoyment in helping others had a strong influence on knowledge contributors with high levels of knowledge self-efficacy, whereas reciprocity had a strong influence on contributors with less knowledge self-efficacy. Moreover, reciprocity and moral obligation had a stronger influence on knowledge contributors with more knowledge-sharing experience.

Appendix A. Constructs and Items

Reputation (Source: (Wasko & Faraj 2005))	
REPU1	I earn respect from others in this community by sharing knowledge.
REPU2	I feel knowledge sharing improves my status in the community.
REPU3	Knowledge sharing improves my reputation in the community.
Reciprocity (Source: (Kankanhalli et al. 2005))	
RECP1	When sharing knowledge through the VC, I believe that I will get an answer after giving an answer.
RECP2	When sharing knowledge through the VC, I expect somebody will respond when I am in need.
RECP3	When sharing knowledge through the VC, I expect to get back what I need when I need it.
RECP4	When sharing knowledge through the VC, I believe that my requests for information will be answered.
Moral obligation (Source:(Cheung & Lee 2012))	
MO1	My conscience calls me to contribute knowledge in this community.
MO2	My decision to share or not in this community is fully in line with my moral conviction.
MO3	I feel morally obliged to share knowledge in this community.
Enjoyment in helping others (Source: (Kankanhalli et al. 2005))	
EH1	I enjoy sharing with others through the community.
EH2	I enjoy helping others by sharing knowledge through the community.
EH3	It feels good to help someone else by sharing knowledge through the community.
EH4	Sharing knowledge with others through the community gives me pleasure.
Knowledge-sharing experience (Self-developed)	
EXP1	On average, how many times do you post/share knowledge in this community per month? (If you posted knowledge, include whether the message was a question or a response to a question; other types of posts [i.e., thank you, happy birthday, or spam] are not included) (less than once, 1–3 times, 4–6 times, 7–9 times, 10–12 times, 13–15 times , 16–18 times, more than 18 times)
Knowledge self-efficacy (Source: (Kankanhalli et al. 2005))	
SELF1	I have confidence in my ability to provide content that others in this community may consider valuable.
SELF2	I have the expertise needed to provide valuable content to the community.
SELF3	It does not make any difference whether I add to content others are likely to share through the community. (R)
SELF4	*Most community members can provide more valuable content than I can. (R)
Continued knowledge-sharing intention (Source: developed based on (Marett & Joshi 2009))	
CKSI1	If I had some knowledge about a topic, I would consider continue posting it on the VC website.
CKSI2	If I had some knowledge regarding a question someone asked, I would continue sharing this knowledge with others.

Notes: *SELF4 were dropped because of poor loadings in factor analysis; (R) indicates a reverse-coded item.

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