

온라인 커뮤니티의 지속적 사용에 대한 이해 : 기술적 관점과 사회적 관점의 비교

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Understanding Continuous Use of Virtual Communities : A Comparison of Technical and Social Perspectives

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■ Abstract ■

The aim of this study is to find the model that best explains members' continued use intention in virtual communities by comparing technical and social perspectives applied in IS context. With the eight major variables identified from prior studies, four alternative models were formulated : 1) A base model from Information Systems (IS) continuance perspective, 2) IS continuance model with technology-acceptance perspective, 3) IS continuance model with social-capital perspective, and 4) IS continuance model with socio-technical combined perspective. The adequacies of these four models with different perspective highlighted were tested using survey data collected from virtual community users in Korea. The findings indicated that the IS continuance model and social-capital perspective is the most efficient model that best explains the members' continued use intention in virtual communities.

Keyword : Virtual Community, Continued Use Intention, Information Systems Continuance Model, Social Capital Theory

1. Introduction

Advances in Internet technology have stimulated the rise of virtual communities [11]. A virtual community is an online group in which individuals come together around a shared purpose, interest, or goal [46, 49]. The myriad studies on virtual communities, however, identify key elements of the virtual community : cyberspace, the use of computer-based Information Technology (IT), and most importantly a focus on communication and interaction around content and topics driven by the participants [31]. We thus define a virtual community as “a cyberspace supported by computer-based IT and centered upon communication interaction of participants to generate member-driven contents, resulting in a relationship being built up [31].”

Especially, Armstrong and Hagel [3] divided the virtual community into four types : transaction-oriented, interest-oriented, fantasy-oriented, and relationship-oriented communities. First, transaction-oriented communities primarily facilitate the buying and selling of goods and services and provide information related to fulfilling these transactions. Participants are encouraged to interact with one another to make informed purchase decisions. Second, interest-oriented communities bring together participants who interact extensively with one another about specific topics of interest. Participants not only carry out transactions with one another, but their interactions are generally focused on a specific topic area. Third, fantasy-oriented communities allow participants to create new environments, personalities, stories or role-play of fantasy. Finally, relationship-oriented communities center on intense personal life experiences and gen-

erally bonding between members. This study focuses on interest-oriented communities because these communities involve a higher degree of interpersonal communication than do communities of transaction which are just focused on the point of product/service purchase [3].

In recent years, virtual communities have become increasingly pervasive, ranging from volunteer, self-organized to company-sponsored [51]. A large number of people voluntarily exchange information and discuss experiences in virtual communities based on shared interests or needs. Companies increasingly attempt to cultivate such virtual communities in order to maintain long-term relationships with their customers [6]. Companies can extract value from such initiatives only when a significant number of community members are willing to stay and exchange information with others [13].

However, those virtual communities that were successful to attract users in the beginning often fail to retain their members and become “cyber ghost towns” [13, 44]. Numerous studies therefore has examined what motivates members to stay and continue engaging in virtual communities but due to the diversified perspectives applied, inconsistent results were obtained in prior studies. For example, in the *social perspective*, the focus is on users’ collective behaviors within virtual communities, such as trust or relationships between members [6, 14, 53, 55]. In the *technical perspective*, the focus is on virtual communities’ technology characteristics (e.g., system quality, information quality) and benefits from using virtual communities (e.g., perceived usefulness) [34, 51]. More recent studies have adopted a *socio-technical perspective*, combining technical and social elements [13, 28, 35, 37].

For these reasons, the objective of this study is to identify the key factors that influence members' continued use intention in virtual communities and examine their impacts through the comparisons of three major theoretical perspectives used in IS studies. We first identify eight key factors related to continued use in virtual communities and formulate four different models including one base model and three competing models. While the base model is formulated based on the Information Systems (IS) continuance model [7], the first competing model integrates the IS continuance model with the Technology Acceptance Model (TAM) from the *technical perspective*, the second competing model integrates the IS continuance model with social capital theory that has been examined in studies adopting a *social perspective*, and the third competing model integrates the IS continuance model with TAM and social capital theory applying a *socio-technical perspective*.

The study is organized as follows. First, we show how the key constructs are derived through extensive literature review. Then we present four types of research models under different theoretical perspectives (one base model and three competing models). We explain how the data are collected and show the data analysis results. Finally, discussions on different model analyses are presented.

2. Theoretical Framework

2.1 Three Major Perspectives on IS Studies

Prior research has examined what motivates members to continue using virtual communities from three different perspectives – *social*, *technical*,

and socio-technical. First, studies adopting a *social perspective* focus on users' collective behaviors in virtual communities, such as trust or relationship between members. Adopting the trust building model, Wu and Tsang [55] investigated whether antecedent factors of participant trust and institutional trust significantly influence members' trust towards virtual communities within a IT-company virtual community. Chiu et al. [14] integrated social cognitive theory and social capital theory to formulate a model for investigating the motivations behind people's knowledge sharing in a IT-oriented virtual community. Wasko and Faraj [53] examined why people voluntarily contribute knowledge and help others through electronic networks based on a professional virtual community. Bauer and Grether [6] also tried to understand the source from which virtual communities draw their power and explain the constituencies of long-term customer relationships within a virtual community. The above-mentioned studies highlighted the importance of social factors in virtual communities, but neglect other factors influencing virtual community participation, such as technical factors. In addition, most studies examined the social factors' influence in the context of a single community.

Second, studies that adopt a *technical perspective* focus on virtual communities' technology characteristics, such as system quality or information quality, and benefits from using virtual communities, such as perceived ease of use or perceived usefulness. The TAM can partly explain online users' intentions [16, 17] and continued use intention. This model represents a preeminent theory of technology acceptance in IS research. Numerous empirical tests have

shown that TAM is a parsimonious and robust model of technology acceptance behaviors across a wide variety of IT. Lin [34] conceptualized, developed, and validated independent variables that result in user satisfaction with and loyalty toward virtual communities based on TAM and the IS success model. Teo et al. [51] examined critical system design elements that could potentially influence the sustainability of virtual learning communities by extending TAM. However, these studies are limited in that they neglect social factors.

Finally, the *socio-technical perspective* attempts to overcome these limitations by combining both technical and social perspectives. Cheung and Lee [13] incorporated social factors into the IS continuance model to explain members' intentions to continue using the community and recommend the community in the context of an education portal virtual community. Lin [35] formulated a model of virtual community success that combined system characteristics based on the IS success model and social factors and empirically tested the model in virtual communities with topics ranging from arts to business and news. The social factors examined were however not based on the relationship and interaction among the members. Chen [11] proposed professional virtual communities' continuance model to advance the understanding of online behavior based on IT professional virtual community by social capital theory, IS success model, and Expectation Confirmation Theory (ECT).

2.2 Identifying Key Factors of Continued Use Intention in Virtual Communities

Largely, three steps were conducted to identi-

fy key factors of continued use intention in virtual communities. First, as shown in <Table 1>, we summarized prior studies by theories (concepts) and variables (constructs), and then classified each variable into one of eight key factors derived. Among the eight key factors, two (confirmation, continued intention) are used for base model, two (perceived usefulness, easy of use) are derived from technical perspective while four (virtual community satisfaction, participation, network quality, and social trust) are derived from social perspective. Accordingly all eight factors combined would be the socio-technical perspective applied. Detailed explanation on each of eight construct will be in the following section of research model development.

3. Four Alternative Models of Continued Use Intention in Virtual Communities

In this study, we compare four different models (i.e., one base model with three competing models) to understand users' continued use intention in virtual communities and to identify the model that best explains members' continued use intention in virtual communities.

3.1 Base Model : IS continuance model

As shown in [Figure 1], we adopt the IS continuance model [7] as a default model to understand members' continued use intention in virtual communities. Continued use implies that the members of virtual communities already have experiences about that community. Based on ECT, the IS continuance model [7] relates satisfaction and perceived usefulness to the degree to which users' expectations about IS are con-

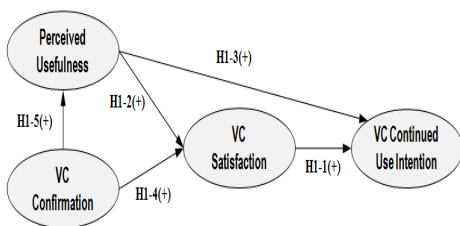
<Table 1> Theories and Variables (Constructs) Used in VC Studies

Key Ref.	Theories	Variables (Constructs)	Base		Socio-technical P.					
			CF	CI	Tech P.		Social P.			
					PE	PU	NQ	SF	ST	PT
[6]	◦ Social capital theory	Network quality					●			
		Norms of reciprocity								●
		Social trust							●	
		Satisfaction						●		
		Trust							●	
		Commitment					●			
[11]	◦ Social capital theory ◦ IS success model ◦ Expectation confirmation theory (ECT)	Social interaction ties expectation	●							
		Social interaction ties confirmation	●							
		Post-usage social interaction ties								●
		Knowledge quality expectation	●							
		System quality expectation	●							
		Knowledge quality confirmation	●							
		System quality confirmation	●							
		Website use satisfaction							●	
[13]	◦ IS continuance model ◦ Social influence theory	Continuance intentions		●						
		Purposive value				●				
		Self-discovery				●				
		Entertainment value				●				
		Social enhancement							●	
		Maintaining interpersonal interconnectivity					●			
		Satisfaction						●		
		Commitment								●
		Group norms							●	
		Intention to continue using						●		
[14]	◦ Social cognitive theory ◦ Social capital theory	Intention to recommend		●						
		Social interaction ties					●			
		Trust							●	
		Norm of reciprocity					●			
		Identification								●
		Shared language								●
		Shared vision								●
		Quantity of knowledge sharing								●
		Knowledge quality						●		
		Personal outcome expectations	●							
[34]	◦ Technology acceptance model (TAM) ◦ IS success model	Community-related outcome expectations	●							
		Perceived ease of use				●				
		Perceived usefulness					●			
		System quality					●			
		Information quality					●			
		Satisfaction with VC						●		
Member loyalty		●								

[35]	◦ IS success model ◦ Social influence	Information quality					●				
		System quality					●				
		Trust									●
		Social usefulness								●	
		Member satisfaction								●	
		Sense of belonging							●		
		Member loyalty			●						
[51]	◦ Extended TAM	Information accessibility					●				
		Community adaptivity					●				
		Perceived usefulness					●				
		Perceived ease of use					●				
		Sense of belonging									●
[53]	◦ Social capital theory	Intention to use			●						
		Reputation								●	
		Enjoy helping								●	
		Centrality							●		
		Self-rated expertise									●
		Tenure in the field									●
		Commitment									●
[55]	◦ Trust building model(TBM)	Reciprocity							●		
		Participant trust(Benefit attraction, Tendency to trust, Share value)								●	
		Institutional trust (Monitoring, Privacy policies)									●
		Trusting belief(Competence, Benevolence, Integrity, Predictability)									●
		Outcomes of trust(Stickiness, Sharing information)			●						

Note) VC = Virtual Community; CF = VC Confirmation; PE = Perceived Ease of Use; PU = Perceived Usefulness; NQ = Network Quality; SF = VC Satisfaction; ST = Social Trust; PT = VC Participation; CI = VC Continued Use Intention.

firmed [33]. Expectation provides a baseline level from which to evaluate the actual performance of the IS while confirmation (or disconfirmation) determines satisfaction [13].



[Figure 1] Default Model : IS Continuation

We believe that continuance decisions of IS users are similar to ongoing participation decisions of virtual community members. The IS continuance model suggests that users' satisfaction is the primary predictor of IS continuance behavior. "A high level of user satisfaction is associated with several key outcomes, including enhanced IS continuance usage and improved user performance ([13], p.283)." Similarly, we can consider user satisfaction with a virtual community as a necessary condition to ensure their return to or repeated participation in the com-

munity [11, 13]. Therefore, we hypothesize that :

H1-1 : Satisfaction with the use of virtual community is positively related to virtual community continued use intention.

Perceived usefulness is “the extent to which a person believes that using a particular system could enhance his/her job performance ([16], p.320).” Many technology acceptance studies have shown that perceived usefulness is a strong determinant of user acceptance, adoption intention, and usage behavior [16, 17]. The intention to accept a new IT determines the perceived usefulness of using the new IT [16, 17], which measures the degree of the each individual’s believes or perception using a particular system could enhance his/her job performance or satisfies their needs. We hypothesize that paths predicted by technology acceptance apply to most virtual community sites. More useful virtual community site would enable the users to accomplish their tasks; therefore, will be used more frequently. Thus, we hypothesize that :

H1-2 : Perceived usefulness of a virtual community is positively related to virtual community satisfaction.

H1-3 : Perceived usefulness of virtual community is positively related to virtual community continued use intention.

Bhattacharjee [7] suggested that user beliefs and attitudes may change over time as a result of hands-on experience with the system. The effect of disconfirmation and satisfaction on IT usage intention is therefore mediated by these later beliefs and attitudes formed as a result of such experiences.

Confirmation with a virtual community is defined as an affective state resulting from a user’s overall evaluation of his/her expectation in comparison with the actual realized benefit of participation in the community. When a user’s expectations regarding the participation experiences within the virtual community are confirmed, there is a higher probability that the user will be satisfied and perceive the community as useful. Stafford et al. [50] explained that gratifications are usually defined as some aspect of satisfaction reported by users. Sangwan [48] also argued that the fulfillment of user needs (i.e., expectation confirmation) affects their satisfaction as well as continued use intention in a virtual community. Therefore, if the users’ needs are fulfilled (confirmed) through using a virtual community, they will be satisfied. Hence, we hypothesize that :

H1-4 : Virtual community confirmation is positively related to virtual community satisfaction.

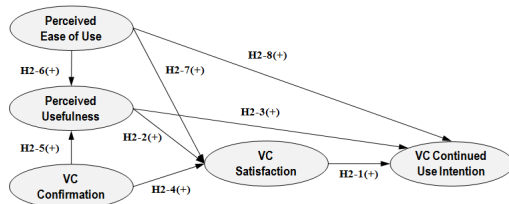
According to cognitive dissonance theory [19], users may experience cognitive dissonance if their pre-acceptance usefulness perceptions are disconfirmed during actual use. Therefore, users may try to reduce this dissonance by modifying their perceived usefulness in order to be more consistent with reality. That is, confirmation will tend to elevate users’ perceived usefulness and reduce disconfirmation [7]. Therefore, we hypothesize that :

H1-5 : Virtual community confirmation is positively related to perceived usefulness of virtual community.

3.2 Competing Model 1 : Integrated IS Continuance-TAM Model

The first competing model proposed in this paper is shown in [Figure 2]. We formulate a model by integrating constructs from the default IS continuance model (H2-1~H2-5) with TAM constructs (H2-6~H2-8). TAM is applied as a framework with technical perspective because it includes key technical variables such as perceived usefulness and ease of use.

Perceived ease of use is “the degree to which a person believes that using a particular system is free of effort ([16], p.320).” Previous research has demonstrated that individuals are more likely to use a new technology if they perceive that it is easy to use [16]. According to Davis et al. [17], perceived ease of use shows a direct effect on intention and an indirect effect on intention through perceived usefulness. Therefore, we hypothesize that :



[Figure 2] Competing Model 1 : IS Continuance-TAM

H2-6 : *Perceived ease of use is positively related to perceived usefulness of virtual communities.*

According to TAM, IT usage intentions are influenced by beliefs regarding the systems' usefulness and ease of use. In particular, perceived ease of use measures the cognitive effort needed

to learn the new IT. TAM has been discussed in great detail in previous research [22, 52]. Perceived usefulness and perceived ease of use have also been found to be important determinants of satisfaction with virtual community sites [34]. Thus, this study applies TAM constructs to examine satisfaction with a virtual community. In addition, Moore and Benbasat [38] showed compatibility, perceived usefulness, and ease of use to be most influential for continued usage decisions. Therefore, we hypothesize that :

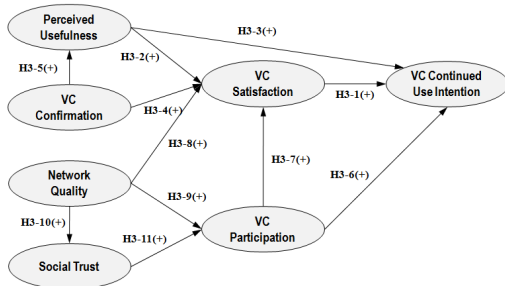
H2-7 : *Perceived ease of use is positively related to virtual community satisfaction.*

H2-8 : *Perceived ease of use is positively related to virtual community continued use intention.*

3.3 Competing Model 2 : IS Continuance Model with Social Capital Theory

The second competing model proposed is shown in [Figure 3]. While the IS continuance model has been empirically validated in the context of virtual communities, the model fails to account for social elements that may influence members' continued use intention in virtual communities. Members of virtual communities are not only individual users of the technical system infrastructure—they are also social actors who develop ongoing relationships with other virtual community members through repeated interaction. As such, it is also important to consider social factors to understand members' behavior in virtual communities [13]. We thus draw on social capital theory to formulate an alternative model from the *social perspective*, by building on the IS continuance model (H3-1~H3-5) to

incorporate social factors that influence members' voluntary participation (H3-6~H3-11).



[Figure 3] Competing Model 2 : IS Continuance-Social Capital

The crux of social capital theory is that social relationships are conducive to productive resources. Social capital is the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit that are accessed and/or mobilized in purposive action [36, 43].

Several outcomes can result from virtual community activity, such as “members’ feeling of ownership of the virtual community, members’ loyalty to the community, or organizational citizenship behaviors (OCB) [27] that entails voluntary acts to help others [5, 18, 39, 40, 54]. In this study, we apply the concept of voluntary participation behaviors (e.g., posting new information, answering others’ requests, providing feedback to others’ posts) to help or give information to other members in a virtual community. It is likely that members who are active participants in a virtual community form a more positive attitude toward their community [27]. The users in a virtual community revealed that they participated in the virtual community mainly for information and knowledge exchange [10].

Such participation is often used to measure the success of virtual community [44]. Therefore, we hypothesize that :

H3-6 : *Virtual community participation is positively related to virtual community continued use intention.*

Benefits of virtual communities do not accrue equally to all members. Passive members those who only read messages may derive the least benefit [49]. This observation is consonant with research on groups and communities in the off-line world that finds that the most active participants derive the most benefit and satisfaction from their participation (e.g., [9]). Also, among active participants, people who participate more extensively report having a greater sense of virtual community. More frequent seekers of information report receiving more helpful replies than less frequent seekers [30]. More frequent providers of information report greater social benefits, pleasure in helping others, and pleasure in advancing the cause of the community [8]. Therefore, we hypothesize that :

H3-7 : *Virtual community participation is positively related to virtual community satisfaction.*

In recent years, social capital concepts have accounted for variance in diverse pro-social behaviors, such as collective action, community involvement, and differential social achievements that individual human or financial capital alone were unable to explain [15]. According to Coleman [15], interpersonal interaction in social networks enhances social capital. Flap and Völker

[20] argue that the strength of individual relationships determines the quality of the social network. The stronger the ties are among members of a virtual community, the higher the quality of the social network is. If many people interact, share information, and help each other, it can be said that the social network is of high quality and that the creation of social capital is likely. In this study, we adopt the view that social capital is “an instrumental and individual resource whose availability depends on other people ([6], p.92).” In other words, the concept encompasses all community ties with friends and other persons of reference who provide social support. Therefore, we suggest that intimate relationships among members can improve members’ satisfaction and intention :

H3-8 : Network quality in virtual communities is positively related to virtual community satisfaction.

H3-9 : Network quality in virtual communities is positively related to virtual community participation.

Trust is a vital part of social capital in virtual communities. There are many similar concepts of trust, but the most basic notion in the management literature involves a set of specific beliefs dealing primarily with integrity, benevolence, and the ability of another party. This study focuses on social trust. Most relevant theories propose that social trust is the most important factor in determining social behaviors. Social trust can be described in terms of “socially learned and confirmed expectations that people have of each other ([29], p.571).” Trust defines the fact that an individual expects a com-

munity to be based on honesty, partnership, and joint norms. Putnam [45] claimed that closed social networks are a precondition for building and maintaining social trust. Therefore, we hypothesize that :

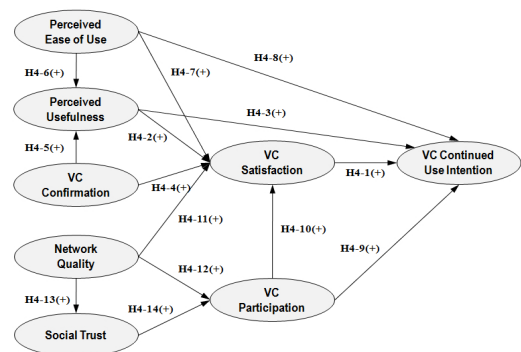
H3-10 : Network quality in virtual communities is positively related to social trust in virtual communities.

According to Wu and Tsang [55], trust building influences both members’ stickiness and their willingness to share information (i.e., participate) in virtual communities. Therefore, we hypothesize that :

H3-11 : Social trust in virtual communities is positively related to virtual community participation.

3.4 Competing Model 3 : IS Continuance Model with TAM and Social Capital Theory

Finally, we propose the third competing model, as shown in [Figure 4], based on IS continuance



[Figure 4] Competing Model 3 : IS Continuance-TAM-Social Capital

model (H4-1~H4-5) in combination with TAM (H4-6~H4-8) and social capital theory (H4-9~H4-14) from the *socio-technical perspective*.

4. Research Methodology

4.1 Measures

We adopted validated measures for our constructs from major prior studies. They are summarized in <Appendix A> with operational definitions and related references. All items are measured on a seven-point *Likert* scale ranging from strongly disagree (1) to strongly agree (7).

4.2 Data Collection

A survey method is applied to test the hypotheses. The data was collected for two weeks in May 2010 via an online-based survey from people in Korea who have use experiences of virtual communities. In total, 172 responses were received. Among them, 4 responses were eliminated from the analysis due to incomplete data, thus 168 responses could be used for the final analysis. The demographic characteristics of the respondents are summarized in <Table 2>.

5. Data Analysis and Results

5.1 Analysis Method

Two-stage structural equation modeling was applied to examine our proposed models and hypotheses [2]. In the first step, the measurement model was examined to ensure the reliability and validity of the measures. The second step tested the structural relationships among latent constructs.

<Table 2> Demographic Profile

Characteristic	Frequency	%
Gender		
Male	88	52.4
Female	80	47.6
Age		
< 20	3	1.8
20~24	19	11.3
25~29	67	39.9
30~34	48	28.6
35~	31	18.5
Position		
Student	70	41.7
Employee	87	51.8
Housewives	7	4.2
Self-employed	1	0.6
Other	3	1.8
VC using period		
< 1 year	7	4.2
1~4	21	12.5
4~7	51	30.4
7~10	42	25.0
10~	47	28.0
Internet usage time per day		
< 3 hours	34	20.2
3~6	77	45.8
6~9	25	14.9
9~12	16	9.5
12~	15	8.9
Missing	1	0.6
Reasons/purpose for using VC		
Fulfilling hobby	37	22.0
Gathering info.	86	51.2
Making relation	14	8.3
Enjoying free time	15	8.9
Others	16	9.5

5.2 Measurement Model

Confirmatory Factor Analysis (CFA) was applied to assess the construct validity of eight main constructs and three control variables (Job, VC using period, and Reasons/Purpose for using VC) with AMOS 18.0. (Refer to <Appendix B> for CFA results of each model). Each item was modeled as a reflective indicator of its latent con-

struct. For VC using period, we first received the real data from the respondents (measure : months) and then normalized it from 1 to 100. We then transformed it on a seven-point *Likert* scale (i.e., from 0 to 14 was converted to 1; from 15 to 29 was converted to 2; from 30 to 43 was converted to 3; from 44 to 57 was converted to 4; from 58 to 71 was converted to 5; from 72 to 86 was converted to 6; from 87 to 100 was converted to 7).

For a good model fit, the chi-square value normalized by degrees of freedom (χ^2/df) should not exceed 5, and Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI) should exceed 0.9 [14]. In the current CFA model, χ^2/df was 1.63 ($\chi^2 = 1384.621$; $df = 850$), NNFI was 0.92, and CFI was 0.92, suggesting adequate model fit.

The instrument's content validity was tested to ensure that the measurement items were consistent with reports in the literature. Convergent validity was assessed by looking at the Composite Reliability (CR) and the Average Variance Extracted (AVE) from the measures [23]. The convergent validity of the scales was verified by using three criteria suggested by Fornell and Larcker [21], that is, (1) all indicator loadings should be significant and exceed 0.7, (2) composite reliabilities (i.e., CR of the constructs) should exceed 0.7, and (3) AVE of each construct should exceed the variance due to the measurement error for that construct (i.e., AVE should exceed 0.5). All loadings of the model were above the 0.7 threshold. As shown in <Table 3>, the CR ranged between 0.80 and 0.94. AVE ranged from 0.68 to 0.92. Finally, discriminant validity of the instrument was assessed by comparing the square root of AVE of the con-

struct and the correlation shared between the construct and other constructs in the model [21].

<Table 3> Result of CFA

Construct	Items	CR	AVE
CF	5	0.87	0.70
PE	5	0.94	0.81
PU	5	0.90	0.72
NQ	5	0.87	0.83
SF	5	0.88	0.74
ST	5	0.81	0.68
PT	5	0.82	0.71
CI	6	0.89	0.72
JB	1	0.80	0.80
PR	1	0.82	0.90
PP	1	0.82	0.92

Note) CR = composite reliability;

AVE = average variance extracted

CF = VC confirmation; PE = perceived ease of use; PU = perceived usefulness; NQ = network quality; SF = VC satisfaction; ST = social trust; PT = VC participation; CI = VC continued use intention; JB = Job; PR = VC using period; PP = VC using purpose.

<Table 4> Correlation between Constructs

	CF	PE	PU	NQ	SF	ST	PT	CI	JB	PR	PP
CF	0.83										
PE	0.50	0.90									
PU	0.63	0.50	0.85								
NQ	0.10	0.17	0.27	0.91							
SF	0.62	0.37	0.63	0.48	0.86						
ST	0.41	0.27	0.40	0.58	0.61	0.83					
PT	0.24	0.17	0.41	0.82	0.59	0.64	0.84				
CI	0.57	0.40	0.73	0.40	0.70	0.55	0.49	0.85			
JB	0.02	-0.08	0.08	0.13	0.10	0.13	0.14	0.04	0.89		
PR	0.21	0.14	0.26	0.08	0.10	0.12	0.10	0.24	0.00	0.95	
PP	-0.02	0.03	0.00	-0.21	-0.09	-0.14	-0.19	-0.12	-0.09	0.07	0.96

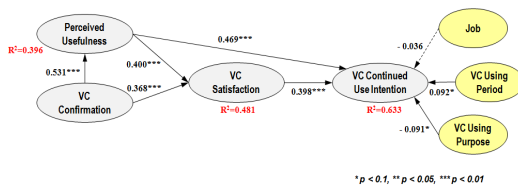
Note) The bolded numbers on the diagonal are the square roots of the AVE.

<Table 4> lists the correlations among the

constructs, with the square root of the AVE on the diagonal. The results revealed that the square root of AVE for each construct was greater than the correlations between each construct and all other constructs. Multicollinearity for all variables was examined using the Variance Inflation Factor (VIF). According to Myers [42], when the VIF is greater than 10, the model built is considered to have a multicollinearity problem. Our results show acceptable values of VIF, ranging from 1.04 to 3.06. Hence, the results of the inter-construct correlations confirmed that each construct shared larger variance with its own measures than with other measures. These results suggest that the measurement models fit the data well and merit further analysis.

5.3 Structural Model

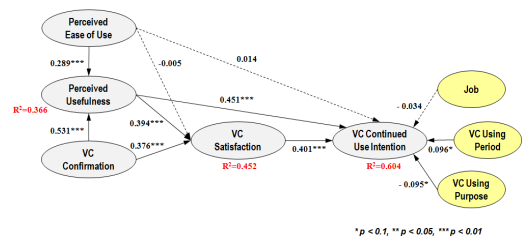
The structural model reflecting the assumed causal relationships among the constructs was tested with the data collected from the validated measures. [Figure 5] to [Figure 8] displays the analysis results of four different models including the path loadings, p-value, and R-squares. [Figure 5] shows the analysis result of Base Model (i.e., IS continuance model). All the hypothesized paths (H1-1~H1-5) were found to be significant at the 0.01 level of significance, i.e., H1-1~H1-5 were supported. Among the control variables, Job did not show any significant ef-



[Figure 5] Analysis Result of Base Model

fect on VC continued use intention. However, VC using period and VC using purpose showed significant relationship with VC continued use intention at the 0.1 level of significance.

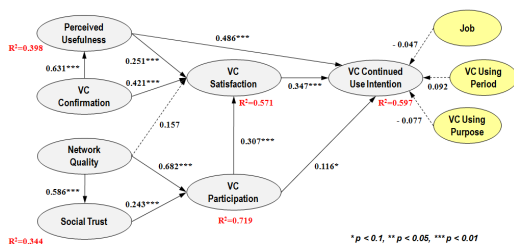
[Figure 6] shows the analysis result of Competing Model 1. In this model, six of eight hypothesized paths (H2-1~H2-6) exhibited a p-value less than 0.01, while the remaining two (H2-7 and H2-8) were not significant at the 0.1 level of significance. H2-1~H2-6 were supported, while H2-7 and H2-8 were not supported. Among the control variables, Job did not show any significant effect on VC continued use intention. However, VC using period and VC using purpose showed significant relationship with VC continued use intention at the 0.1 level of significance. The R-square value of perceived usefulness is 0.366 (i.e., perceived ease of use and VC confirmation account for 36.6% of variance of perceived usefulness), while that of VC satisfaction is 0.452 (i.e., VC confirmation and perceived usefulness account for 45.2% of variance of VC satisfaction) and VC continued use intention is 0.604 (i.e., perceived usefulness, VC satisfaction, VC using period, and VC using purpose account for 60.4% of variance of VC continued use intention).



[Figure 6] Analysis Result of Competing Model 1

[Figure 7] shows the analysis result of Competing Model 2. In this result, nine of eleven hy-

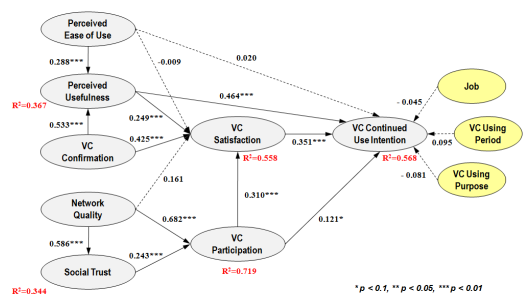
pothesized paths (H3-1~H3-5, H3-7, and H3-9~H3-11) exhibited significant at the 0.01 level significance and one of eleven paths (H3-6) was significant at the 0.1 level of significance, while the remaining one (H3-8) was not significant at the 0.1 level of significance. That is, the result shows that H3-1~H3-7 and H3-8~H3-11 were supported, while H3-8 was not supported. Interestingly, none of the three control variables showed any significant relationship with VC continued use intention. The R-square value of perceived usefulness is 0.398 (i.e., VC confirmation accounts for 39.8% of variance of perceived usefulness) while the R-square value of social trust is 0.344 (i.e., network quality accounts for 34.4% of variance of social trust) and the R-square value of VC participation is 0.719 (i.e., network quality and social trust account for 71.9% of variance of VC participation). The R-square value of VC satisfaction is 0.571 (i.e., VC confirmation, perceived usefulness, and VC participation account for 57.1% of variance of VC satisfaction) and that of VC continued use intention is 0.597 (i.e., perceived usefulness, VC satisfaction, and VC participation account for 59.7% of variance of VC continued use intention).



[Figure 7] Analysis Result of Competing Model 2

[Figure 8] shows the analysis result of Competing Model 3. In this result, ten of fourteen hypothesized paths (H4-1~H4-6, H4-10, and

H4-12~H4-14) exhibited significant at the 0.01 level significance and one of fourteen paths (H4-9) was significant at the 0.1 level of significance, while the remaining three (H4-7~H4-8, and H4-11) were not significant at the 0.1 level of significance. That is, the result shows that H4-1~H4-6, H4-9~H4-10 and H4-12~H4-14 were supported, while H4-7~H4-8, and H4-11 were not supported. As in the competing model 2, none of the three control variables showed any significant relationship with VC continued use intention. The R-square value of perceived usefulness is 0.367 (i.e., VC confirmation and perceived ease of use account for 36.7% of variance of perceived usefulness) while the R-square value of social trust is 0.344 (i.e., network quality accounts for 34.4% of variance of social trust). The R-square value of VC participation is 0.719 (i.e., network quality and social trust account for 71.9% of variance of VC participation) and that of VC satisfaction is 0.558 (i.e., VC confirmation, perceived usefulness, and VC participation account for 55.8% of variance of VC satisfaction) and that of VC continued use intention is 0.568 (i.e., perceived usefulness, VC satisfaction, and VC participation account for 56.8% of variance of VC continued use intention).



[Figure 8] Analysis Result of Competing Model 3

<Table 5> Comparison among Four Different Models

Comparison measures	Recommended level	Base Model	Competing Model 1	Competing Model 2	Competing Model 3
Absolute fit measures					
◦ Chi-square:df		378.97; 247	605.42; 369	1198.36; 691	1523.85; 888
◦ (p-value)	p > 0.05	(p = 0.000)	(p = 0.000)	(p = 0.000)	(p = 0.000)
◦ Goodness of fit index (GFI)	> 0.9	0.835	0.797	0.742	0.716
◦ Root mean square residual (RMSR)	Close to 0	0.121	0.233	0.343	0.353
◦ Root mean square error of approximation (RMSEA)	< 0.08	0.057	0.062	0.066	0.065
Incremental fit measures					
◦ Adjusted goodness of fit index (AGFI)	> 0.9	0.800	0.761	0.708	0.684
◦ Non-normed fit index (NNFI)	> 0.9	0.954	0.938	0.910	0.904
◦ Normed fit index (NFI)	> 0.9	0.890	0.868	0.823	0.809
◦ Comparative fit index (CFI)	> 0.9	0.959	0.943	0.916	0.910
Parsimonious fit measures					
◦ Parsimonious goodness of fit index (PGFI)	Maximum value	0.688	0.676	0.657	0.642
◦ Parsimonious normed fit index (PNFI)	Maximum value	0.797	0.789	0.767	0.760
◦ Normed Chi-square (χ^2/df)	1.0~2.0/3.0	1.534	1.641	1.734	1.716
Number of constructs and paths	N/A	4~5	5~8	7~11	8~14
% of hypotheses accepted (Number of accepted/proposed hypotheses)	Maximum value	100% (5/5)	75% (6/8)	91% (10/11)	79% (11/14)

Note) Base Model = IS continuance model; Competing Model 1 = IS continuance model+TAM;
 Competing Model 2 = IS continuance model+Social capital;
 Competing Model 3 = IS continuance model +TAM+Social capital.

<Table 5> shows the comparison results between the base model and three competing models. In this study, these models were compared in terms of the overall fit measures (including absolute, incremental, and parsimonious fit measures) of the model and the number of hypotheses accepted.

6. Discussion and Implications

6.1 Findings

The main findings of the study are two folds. First, social perspective seems to be the most appropriate perspective to interpret the continued intention of users to use virtual community. In the comparison of the models, we basically followed four guidelines, suggested by Janik and

Toulmin [25], that have been adopted by several studies [12, 24, 41] : 1) logical or formal consistency, 2) empirical adequacy, 3) the ability to capture most of the essential relations among the variables, and 4) simplicity.

Especially, considering absolute, incremental, and parsimonious fit measures and the number of hypotheses accepted, it seems that Competing model 2 built on IS continuance model with social capital theory (i.e., social perspective) best explains the overall members' continued intention in virtual communities. Although the customary fit measures showed an acceptable fit for Competing model 1 (i.e. technical perspective), model 2 (i.e., social perspective) and model 3 (i.e., socio-technical perspective), overall fit measures favored Competing model 2 when considering model parsimony (i.e., 8 paths and 5 constructs

for Competing model 1, 11 paths and 7 constructs for Competing model 2, and 14 paths and 8 constructs for Competing model 3).

Furthermore, Competing model 2 showed the highest percentage of accepted hypotheses as summarized in <Table 5>. It indicates the importance of the social factors rather than others in the virtual community context. In addition, Competing model 2 showed overall high R-square values for each endogenous latent variable (i.e., eta). In the case of VC satisfaction, the explanatory power of R-square values showed 45.2% (Competing model 1), 57.1% (Competing model 2), and 55.8% (Competing model 3) respectively. In the case of VC continued use intention, the explanatory power of R-square values showed 60.4% (Competing model 1), 59.7% (Competing model 2), and 56.8% (Competing model 3) respectively. The result showed that the R-square value of Competing model 1 is higher than Competing model 2. However, we infer the reason that the explanatory power of Competing model 1 includes the effect of control variables (i.e., VC using period and VC using purpose). In other words, in Competing model 2, none of the three control variables showed any significant relationship with VC continued use intention. Thus, we argue that Competing model 2 is more accurate to explain members' continued use intention in virtual communities than the Competing model 1.

The second interesting finding of the study is the different significances of the factors that are different from our conjecture. For example, perceived ease of use is not found to be a significant factor in the virtual community continued use context across the proposed models. We infer the reason that although perceived ease

of use is an important factor in deciding whether to join a virtual community or not for the first time, it is not the case for users' continued use intention [26]. In addition, the results of this study confirm that the relationship factors derived from the social capital theory are important for users' continued use intention in the context of virtual community. In particular, virtual community participation is a crucial factor for both the virtual community satisfaction and continued use intention. Moreover, the results show that virtual community participation mediates the relation between network quality (interaction among the virtual community members) and virtual community satisfaction. This result can be interpreted in that users are more satisfied with the virtual community when they are actively participating in the virtual community through the community networks.

6.2 Theoretical Contributions

The theoretical contributions of this study are multifaceted. First, this study compares major perspectives that are often applied in IS studies and assesses the adequacy of those perspectives in analyzing user behavior in a virtual community. Applying the correct and most appropriate perspective is critical in research to determine factors to consider, the methodology, and the outcomes. However, prior studies have intensively developed and extended widely used perspectives but did not integrate them. Therefore, the current study compares these perspectives in parallel to suggest the best possible theoretical framework for a specific context, and shows how much better the best possible model (or perspective) is than others. The results of the current study also indicate that social factors,

such as network quality and participation, are more influential than technological factors in using a virtual community.

Another contribution of the current study to the literature is that it links participation to the continued use of a virtual community. While most prior virtual community studies focused on attracting users and initiating their communications, the current study considers further that the manner of retaining existing users is even more critical than attracting new users. Moreover, the current study highlights the concept of active and voluntary participation as a significant reason users stay in the community, which differentiates this project from prior studies. The possible cyclical interaction between active participation and continued use shows the virtue circle of user behavioral patterns.

6.3 Practical Implications

The implication of this study on practitioners is the help it can provide community leaders to stimulate their virtual communities in the long term. The long-standing challenge for all community moderators has been to maintain an active community. This study emphasizes to those leaders that the social aspects of the community are the factors that require greater consideration to ensure the long-term success of a virtual community. Virtual community users seem to focus less on the technical platform of the community but more on social interaction built out of trust and satisfaction. Unless the foundation for building such emotional ties has been established in a virtual community, providing highly technical services would not guarantee success.

Another practical implication of this study is that it contrasts the difference between the te-

chnical and social aspects of a virtual community, which are, in reality, often perceived together. Practitioners must understand the virtual community features in detail so they can respond to each of these points from the marketing/promotion perspective. In this sense, this study provides several basic frameworks for practitioners that ensure that various functionalities of virtual communities can be viewed from either technical or social perspectives—or both—to enable managers to develop strategies in a more sensitive manner.

6.4 Limitations and Future Research

This study also has a few limitations, some of which offer opportunities for future research. The majority of survey respondents are in their 20s and 30s. Even if these demographic well represents the current majority of the virtual community users, future studies are expected to collect data from various groups and different regions to enhance the generalizability of the results. Also, even though variables identified in this study were formulated by reviewing previous theories and literature, more variables affecting user's continued intention should be studied. The variables identified are open to refinement and further verification. While the results of this study may benefit company managers retaining the existing users of their virtual communities, more empirical research is needed to recommend more practical guidelines for each variable identified individually.

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〈Appendix A〉 Measures Used for Constructs

Construct	Definition	Item	Ref.
Virtual community satisfaction	Users' feelings about prior use of virtual communities [7] /the positive affect or attraction to a relationship [32]	<ul style="list-style-type: none"> ◦ I feel pleased about my overall experience with VC use. ◦ I feel contented about my overall experience with VC use. ◦ I feel delighted about my overall experience with VC use. ◦ I feel fulfilled about my overall experience with VC use. ◦ I feel happy about my overall experience with VC use. 	[7, 32, 47]
Virtual community participation	Degree of voluntary participation behaviors to help or give information to other members in a virtual community	<ul style="list-style-type: none"> ◦ I take an active part in our VC. ◦ I do my best to stimulate our VC. ◦ I often provide useful information/contents to our VC members. ◦ I often post or reply in our VC. ◦ I often help our VC members who seek support from other members. 	[27]
Virtual community confirmation	Users' perception of the congruence between expectations for virtual community use and its actual performance	<ul style="list-style-type: none"> ◦ My experience with using the VC was better than I expected. ◦ The service level provided by the VC was better than I expected. ◦ Overall, most of my expectations from using the VC were confirmed. ◦ The benefit provided by the VC was better than I expected. ◦ Overall, my experience with using the VC was better than I expected. 	[7]
Perceived usefulness	The degree to which a person believes that using a particular system could enhance his or her job performance	<ul style="list-style-type: none"> ◦ Using the VC is of benefit to me. ◦ Using the VC would improve my knowledge about areas of interest. ◦ Using the VC site is useful in my hobby or area of interest. ◦ Using the VC site would improve my job performance. 	[1, 16]
Perceived ease of use	The degree to which a person believes that using a particular system is free of effort	<ul style="list-style-type: none"> ◦ Learning to operate the VC site is easy. ◦ It was easy to become skillful in using the VC site. ◦ I find the VC site to be flexible to interact with. ◦ I find the VC site easy to use. ◦ My interaction with the VC site is clear and understandable. 	[1, 16]
Network quality	Specific types of relationships that link defined sets of people /interaction with virtual community members while using virtual communities' information or contacting with members	<ul style="list-style-type: none"> ◦ I know many members in the VC. ◦ I bond with others. ◦ I have long-term contacts. ◦ I feel part of the VC. ◦ I have contact with many VC members. 	[6]
Social trust	Socially learned and confirmed expectations that people have of each other/the fact that an individual expects a community to be based on honesty, partnership, and joint norms	<ul style="list-style-type: none"> ◦ Members in the VC behave in a consistent manner. ◦ Members in the VC would not knowingly do anything to disrupt the conversation. ◦ Members in the VC are truthful in dealing with one another. ◦ Members in the VC are going to help each other. 	[6]
Virtual community continued use intention	Users' intention to continue using a virtual community [7] /the likelihood that a user will continue to use a virtual community [13]	<ul style="list-style-type: none"> ◦ I intend to continue to use this VC in the future. ◦ I am willing to communicate with the VC's other members. ◦ I expect to obtain needed information by using VC in the future. ◦ I believe it is worthwhile for me to return to use the VC. ◦ I intend to use this VC frequently in the future. 	[4, 7, 13]

〈Appendix B〉 CFA results

〈Table B1〉 CFA Result between Models

Construct	Items	CR				AVE			
		B. Model	Model 1	Model 2	Model 3	B. Model	Model 1	Model 2	Model 3
CF	5	0.87	0.87	0.87	0.87	0.70	0.70	0.70	0.70
PE	5	-	0.94	-	0.94	-	0.81	-	0.81
PU	5	0.90	0.90	0.90	0.90	0.72	0.72	0.72	0.72
NQ	5	-	-	0.87	0.87	-	-	0.83	0.83
SF	5	0.88	0.88	0.88	0.88	0.74	0.74	0.74	0.74
ST	5	-	-	0.81	0.81	-	-	0.68	0.68
PT	5	-	-	0.82	0.82	-	-	0.71	0.71
CI	6	0.89	0.89	0.89	0.89	0.71	0.71	0.72	0.72
JB	1	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
PR	1	0.82	0.82	0.82	0.82	0.90	0.90	0.90	0.90
PP	1	0.82	0.82	0.82	0.82	0.92	0.92	0.92	0.92

Note) CR = composite reliability; AVE = average variance extracted.

CF = VC confirmation; PE = perceived ease of use; PU = perceived usefulness; NQ = network quality; SF = VC satisfaction; ST = social trust; PT = VC participation; CI = VC continued use intention; JB = Job; PR = VC using period; PP = VC using purpose.

〈Table B2〉 Correlation between Constructs

(a) Base Model								(c) Competing Model 2										
	CF	PU	SF	CI	JB	PR	PP		CF	PU	NQ	SF	ST	PT	CI	JB	PR	PP
CF	0.83							CF	0.83									
PU	0.63	0.85						PU	0.63	0.85								
SF	0.62	0.63	0.86					NQ	0.10	0.27	0.91							
CI	0.57	0.73	0.70	0.85				SF	0.62	0.63	0.48	0.86						
JB	0.02	0.08	0.10	0.04	0.89			ST	0.41	0.40	0.58	0.61	0.83					
PR	0.21	0.26	0.10	0.24	0.00	0.95		PT	0.24	0.41	0.82	0.59	0.64	0.84				
PP	-0.02	0.00	-0.09	-0.12	-0.09	0.07	0.96	CI	0.57	0.73	0.40	0.70	0.55	0.49	0.85			
								JB	0.02	0.08	0.13	0.10	0.13	0.14	0.04	0.89		
								PR	0.21	0.26	0.08	0.10	0.12	0.09	0.24	0.00	0.95	
								PP	-0.02	0.00	-0.21	-0.09	-0.14	-0.19	-0.12	-0.09	0.07	0.96

(b) Competing Model 1								(d) Competing Model 3												
	CF	PE	PU	SF	CI	JB	PR	PP		CF	PE	PU	NQ	SF	ST	PT	CI	JB	PR	PP
CF	0.83								CF	0.83										
PE	0.50	0.90							PE	0.50	0.90									
PU	0.63	0.50	0.85						PU	0.63	0.50	0.85								
SF	0.62	0.37	0.63	0.86					NQ	0.10	0.17	0.27	0.91							
CI	0.57	0.40	0.73	0.70	0.85				SF	0.62	0.37	0.63	0.48	0.86						
JB	0.02	-0.08	0.08	0.10	0.04	0.89			ST	0.41	0.27	0.40	0.58	0.61	0.83					
PR	0.21	0.14	0.26	0.10	0.24	0.00	0.95		PT	0.24	0.17	0.41	0.82	0.59	0.64	0.84				
PP	-0.02	0.03	0.00	-0.09	-0.12	-0.09	0.07	0.96	CI	0.57	0.40	0.73	0.40	0.70	0.55	0.49	0.85			
									JB	0.02	-0.08	0.08	0.13	0.10	0.13	0.14	0.04	0.89		
									PR	0.21	0.14	0.26	0.08	0.10	0.12	0.10	0.24	0.00	0.95	
									PP	-0.02	0.03	0.00	-0.21	-0.09	-0.14	-0.19	-0.12	-0.09	0.07	0.96

Note) The bolded numbers on the diagonal are the square roots of the AVE

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현재 고려대학교 경영대학 박사과정(MIS 전공)에 재학 중이며, 연세대학교 정보대학원에서 정보시스템 석사 학위를 취득하였다. 주요 관심분야는 개방형 혁신(Open Innovation) 전략, 오픈/공공데이터(Open Data) 제공 및 활용 전략, IT/IS의 지속적 사용 등이다.



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현재 고려대학교 경영대학 교수로 재직하고 있다. 한국과학기술원 테크노 경영대학원에서 경영공학 석사/박사 학위를 취득하였다. City University of Hong Kong에서 강의와 연구를 수행한 경력을 가지고 있으며, 주요 관심 분야는 정보기술 아웃소싱, 지식 경영, 정보 보안, 정보기술의 기업 확산 및 영향 등이다. MIS Quarterly, ISR, Journal of MIS, Journal of the AIS, IEEE Transactions on Engineering Management, Communications of the ACM, Information and Management, 경영학 연구, 지식경영학 연구, APJIS 등을 포함한 다수의 국내외 학술지에 논문을 발표하였다. MIS Quarterly, ISR 등의 편집위원을 역임했으며, 현재 Journal of the AIS, Pacific Asia Journal of the AIS, Electronic Commerce Research and Applications 등의 저널에서 편집위원으로 활동하고 있다.



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현재 Kazakhstan에 위치한 KIMEP 대학에 교수로 재직 중이며 고려대학교에서 경영정보시스템 박사학위를 취득하였다. 석사는 연세대학교 정보대학원, 학사는 한국과학기술원 생물학과에서 취득하였다. 주요 관심분야는 전자상거래, 온라인 의사소통이며 지금까지 Decision Support Systems, Information and Management, Information Systems Frontiers, International Journal of Electronic Commerce 등의 저널에 다수의 논문을 발표하였다.