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ABSTRACT

The success of the Enterprise 2.0 KMS (knowledge management systems) depends on the user's continuous participation in the process of knowledge sharing. This study attempts to identify the determinants of the user's intention to continuous knowledge sharing based on Expectation Confirmation Theory and Channel Expansion Theory. We also consider communication process modes (i.e., blog and wiki) as a moderator for perceived channel richness. The results of our analysis show the positive effects of all the predictors. With regard to the moderating effects of communication process modes, the effect of experiences shared with group members is greater in the channel to support conveyance, and the effects of experiences about the channel and the group task are greater in the channel to support convergence.

Keywords

Blog, channel expansion theory, enterprise 2.0, expectation confirmation theory, knowledge sharing, web 2.0, wiki.

INTRODUCTION

Knowledge has been emphasized as a means for a company to secure sustained competitive advantage in rapidly changing market environments (Davenport and Prusak, 1998). In particular, knowledge sharing among members within an organization plays a vital role as an efficient and effective method of acquiring various and specialized knowledge, essential for the success and survival of an organization (Paul, 2006).

McAfee (2006) conceptualizes the term "Enterprise 2.0" as a platform to visualize outputs and practices of knowledge workers with Web 2.0 technologies. Enterprise 2.0 KMS can facilitate the open communication channel, in which voluntary participation by diverse members is promoted. Hence, the systems are expected to enhance the performance of a business entity and further contribute to creating new profits. Forrest Research (2008) predicted that enterprise spending on Web 2.0 technologies will grow strongly over the next five years, reaching $4.6 billion by 2013 globally.

The success of the Enterprise KMS highly depends on the user's continuous participation in the process of knowledge sharing. So, this study aims to address the following research question—*what factors influence the user's continuous knowledge sharing through Web 2.0 technologies in the collaborative environment?*

The findings of this study offer some practical values for a company to choose more effective collaborative technology or to design a new system based on internal factors of members such as each individual's various experiences. Such considerations can promote voluntary and continuous participation of members who will enhance job performances to achieve the business goal through the Enterprise 2.0 KMS.

LITERATURE REVIEW

Knowledge Sharing in Organizations

As different companies accumulate different knowledge and compete based on their accumulated knowledge (Stinchcombe, 1990; von Krogh and Roos, 1995), the ability of managing their knowledge base is becoming an important enabler of sustained competitive advantage (Spender and Grant, 1996). And as organizational tasks become more complicated and

specialized, knowledge is also becoming increasingly specialized and segmented (Nonaka and Takeuchi, 1995). Consequently, the majority of organizational processes necessitate knowledge sharing among different individuals who possess diverse specialized know-how and experiences (Kock and Davision, 2003; Paul, 2006).

Because the organizational value of individual knowledge increases when it is shared within an organization (Styhre, 2002), the growth of knowledge assets of an organization is dependent on how willing organization members are to share their experiences, insight, or wisdom (Davenport and Prusak, 1998). Verkasalo and Lappalainen (1998) also argue that the knowledge utilization process within an organization begins with the willingness of the members to share their knowledge. According to Kane et al.'s study (2005), knowledge sharing plays a critical role in the survival and success of a work group or a community of practice responsible for completing a project within the allotted timeframe. In particular, when the members are dispersed by temporal or spatial differences, and if their communication occurs primarily through electronic channels, it becomes even more important to promote knowledge sharing (Cecez-Kecmanovic, 2001; Davenport and Prusak, 1998; Leonard and Sensiper, 2002).

The Effects of CMC on Knowledge Sharing

Knowledge sharing mediated by information and communication technologies (ICTs) enables the exchange of knowledge in cyberspace, while enlarging the knowledge network and expanding knowledge resources available for use. However, it has also been pointed out that because CMC is unable to provide sufficient social cues or media richness, they also have limitations in terms of knowledge sharing (Te'eni, 2001). But from a different perspective, Walther (1995) argues that CMC supporting 'hypersonal interaction' actually strengthens social relationship than even the face-to-face communication. Moreover, van den Hooff and de Leeuw van Weenen (2004) insist that anonymity, lack of social cues, and the absence of social status in CMC environment have a positive influence on the users' intention to knowledge sharing.

Despite the fact that previous studies have not shown consistent findings with respect to the effects of CMC on knowledge sharing activities, the most important implication of them is that the higher level of media richness increases the likelihood of efficient and collaborative knowledge sharing.

Channel Expansion Theory

Media Richness Theory (Daft and Lengel, 1986) explains the richness of communication channels as an objective characteristic determining each channel's capacity to process rich information. But Channel Expansion Theory (CET) proposed by Carlson and Zmud (1999) maintains that individuals perceive the richness of a given channel differently according to their relevant experiences: experiences with channels, experiences with message topics, experiences with communication co-participants, and experiences with organizational context. Based on each of these domains, individuals develop knowledge bases that can be used to process richer information on a channel. Knowledgeable individuals are able to communicate effectively through a given channel, thus they perceive it as becoming richer.

Expectation Confirmation Theory

Knowledge sharing within an organization using Web 2.0 technologies aims for improving task performance through voluntary participation of members. This implies that the continuous participation of users is of utmost importance. Expectation Confirmation Theory (ECT) provides a useful theoretical framework for understanding the continuous usage in the field of IS (information systems).

ECT was proposed by Oliver (1980) in order to explain the consumer's intention to repurchase. After forming initial expectations of a specific products or service prior to an actual purchase, customers accept or use the product or service. Following the initial consumption, consumers develop perceptions about the performance of it. Consumer satisfaction is then determined by the extent which the perceived performance confirms the initial expectation. Serving as the reference point for evaluating the product or service, the expectation becomes the key determinant of satisfaction.

Since Bhattacherjee (2001) examined ECT to describe the IS user's continuance, a number of studies have employed the theory to explore the intention to continuous usage in IS (Bhattacherjee and Premkumar, 2004; Hsu et al., 2004; Hsu et al., 2006; Lin et al., 2005; Roca et al., 2006; Thong et al., 2006). Of course, a variety of factors are considered depending on the topic, but satisfaction is widely seen as a key factor for the intention to continuance.

RESEARCH HYPOTHESES AND MODEL

The success of the Enterprise 2.0 KMS depends on the user's continuous participation. So the dependent variable is the user's intention to continuous knowledge sharing. We consider the satisfaction with knowledge sharing as a determinant of the

intention to continuance. And we assume the user's satisfaction is influenced by perceived channel richness. We propose the following hypotheses based on Expectation Confirmation Theory and Channel Expansion Theory:

H1. A user's level of satisfaction with knowledge sharing using a channel is positively associated with his/her intention to continuous knowledge sharing.

H2. A user' perception of channel richness is positively associated with his/her satisfaction with knowledge sharing.

H3.1. The knowledge-building experiences a user has with <u>group members</u> are positively associated with his/her perception of richness of the channel used in knowledge sharing with them.

H3.2 The knowledge-building experiences a user has with a <u>task topic</u> are positively associated with his/her perception of richness of the channel used in knowledge sharing with group members about that topic.

H3.3. The knowledge-building experiences a user has with a <u>channel</u> are positively associated with his/her perception of richness of the channel used in knowledge sharing.

Dennis et al. (2008) argue that task type is too broad to address the relation between the media choice and task performance. Thus, they argue that task must be considered in terms of the communication processes required for the task. All tasks require a series of conveyance and convergence processes (Fulk and Boyd, 1991; Huang and Wei, 2000; Dennis et al., 2008).

Conveyance focuses on transmission of large amounts of new information to make the receivers to create and to revise a mental model of the communication situation. However, it is not needed that every communication participants focus on same information or reach an agreement on the meaning of exchanged information. Thus, the media capacity to support the high level of parallelism enhances communication performance in conveyance. Parallelism is "the extent of to which signals from multiple senders can be transmitted over the medium simultaneously" (Dennis et al., 2008).

Convergence involves in the discussion of preprocessed information about each participant's interpretation of the communication situation. The goal of the process is to agree on the meaning of the exchanged information among participants. It is needed that participants transmit and process information promptly to develop the shared understanding. Thus, in the process, the media capacity to support immediate and rapid feedback allow participant coordinate and negotiate quickly and efficiently.

Dennis et al. (2008) insist that more familiar with partners, a task, and a media users become, the less needs of the media synchronicity will be. This means that the more experiences with the communication situation users have, the less importance of the media supporting convergence will be. However, we believe the effects of communication process will be changed according to a kind of experience in these domains. That is, if a channel supports a specific communication process, the effects of' knowledge-building experiences are moderated by communication process modes.

Because the purpose of convergence is to bring out the common understanding from participants and to reach the mutual agreement, we assume that shared understanding among participants can be formed easily and quickly when using a channel supporting convergence rather than using a channel supporting conveyance. Thus, the effect of experiences with group members on the perceived channel richness will be higher in using a channel which supports convergence (H4.1).

The more knowledge related to a given task users obtain, the more actively they can take part in the activities of knowledge exchange. Also, when each user has similar level of knowledge, his/her desire for equal participation will be getting stronger. Thus, we hypothesized that the effect of experiences with a task topic on the perceived channel richness will be higher in using a channel which supports conveyance (H4.2).

The more comfortable and easier participants can use the channel, the less efforts users need to encode and decode knowledge. That is, when a user become more familiar with the channel, it is possible that he/she can transmit own knowledge and modify shared knowledge with less spending time. Thus, familiarity with a channel will be the critical factor in convergence where fast feedback is required. In here, the effect of experiences with a channel will be higher in using a channel which supports convergence (H4.3).

H4.1. The effect of experiences with group members is higher in a channel supporting convergence than in a channel supporting conveyance.

H4.2. The effect of experiences with a task topic is higher in a channel supporting conveyance than in a channel supporting convergence.

H4.3. The effect of experiences with a channel is higher in a channel supporting convergence than in a channel supporting conveyance.

Figure 1 illustrates our research model which will be empirically validated in the next section.
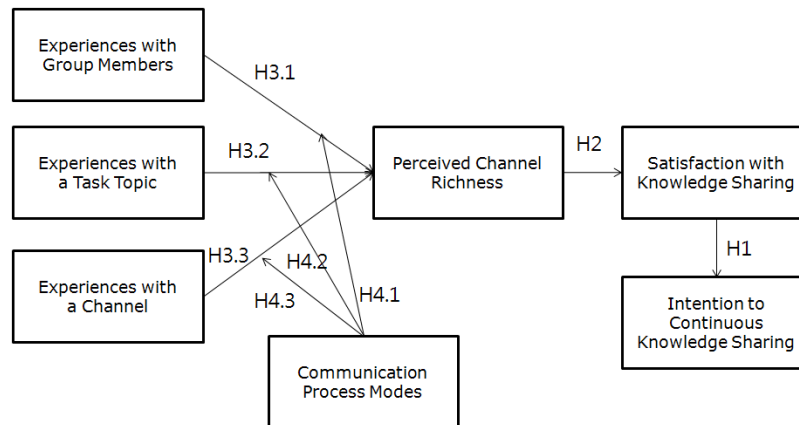

Figure 1. Research Model

RESEARCH METHODS AND DATA

This study performed an experiment with student subjects and collected the data for verifying our research model.

To examine the moderating effect of communication process modes, we chose blog and wiki, the representative web 2.0 technologies, as the channels for knowledge sharing. Specifically, we considered blog as a channel supporting conveyance and wiki as a channel supporting convergence. A wiki site, linked with a class site, was developed by using MediaWiki, applied in Wikipedia. Blogs were constructed by each student in Microsoft's Windows Live Spaces.

98 undergraduate students from 2 MIS classes in a well-known university in Korea took part in the experiment. Subjects were consisted of 78 males (80%) and 20 females (20%). We surveyed whether the subjects had experiences in using blog or wiki. The students who had experiences with blog was 49 (50%) and those who had experiences with wiki was 23 (23%). The result is likely to reflect that there are few public wiki sites in Korea. But most students having experiences with blog had used it for personal purposes such as personal web diary. Thus, their experiences are quite different from collaborative knowledge sharing. So we performed pre-operation to promote the variance of subject's experiences with collaborative activities using the channels. The contents and process of pre-operation is as follows.

Students executed easier group-tasks before assigning actual group-tasks for the experiment. We grouped 4-5 students randomly and assigned a channel (i.e., blog or wiki) to each group. The composition rate of blog and wiki group was the same in each class. The task of pre-operation was to explain MIS-related terms in students' own blog or each group's wiki site. As we explained them that assigned works were not reflected to the grade, we tried to derive their volunteered participation. The condition that the subject's exposure to the experience, related to the knowledge sharing, was identical. But whether participating or not totally depended on the individual's decision.

After completing pre-operation, we assigned group tasks to students for verifying the research model. We regrouped students randomly, focusing on the grouping among students who used identical channel in pre-operation. For example, students who had used blog in pre-operation were assigned to a group using blog. Two case studies were chosen as group tasks from a textbook of the course, *Essentials of Management Information Systems* (Laudon and Laudon, 2008).

ANALYSIS AND RESULTS

We chose partial least squares (PLS) structural equation analysis to test the hypotheses. A PLS model has been analyzed and interpreted in two stages: the assessment of the reliability and validity of the measurement model, and the assessment of the structural model (Wasko and Faraj, 2005).

Tests of the Measurement Model

The strength of the measurement model was evaluated by measures of convergent and discriminant validity (Hair et al., 1998). First, convergent validity was assessed by examining the average variance extracted (AVE). AVE values should be greater than 0.5 (Fornell and Larcker, 1981). Also, indicators that make up a theoretical construct must be assessed for inter-item reliability. This was estimated using the composite reliability (ICR) in PLS, and the value of an ICR should exceed 0.7

(Fornell and Larcker, 1981). Another way to assess reliability of constructs is to calculate Cronbach's alpha, and a score of 0.7 indicates adequate reliability of constructs (Hair et al., 1998). To examine discriminant validity, we assessed AVE of each construct with the square of the correlations among the latent variables (Keil et al., 2005; Wasko & Fara, 2005).

Both discriminant and convergent validity are also evaluated with factor loadings of each indicator (Wasko & Fara, 2005). Factor loadings of each indicator should be greater than one of other factors and higher than 0.7 simultaneously (Keil et al., 2000). However, Chin (1998) explains a score of at least 0.5 might be acceptable, and other IS studies employing PLS have also used 0.5 as a threshold value. So, we chose 0.5 as cut-off.

According to the results of the tests, 10 indicators were shown as not satisfying the criterion of convergent and discriminant validity. We analyzed the modified measurement model, where items hampering the strength of the original measurement model were deleted. As shown in Table 1, the values of ICR, AVE, and Cronbach's alpha are above the reasonable level. Table 2 contains the square root of the AVE. All AVEs are greater than the off-diagonal elements in the corresponding rows and columns. Factor loadings and cross-loadings were presented in Table 3. These results demonstrate convergent and discriminant validity of the modified measurement model. The structural model was estimated based on it.

Combined dataset		ICR	AVE	Cronbach's Alpha
Experiences with group members	EP	0.89	0.68	0.84
Experiences with a task topic	ET	0.85	0.65	0.72
Experiences with a channel	EC	0.92	0.69	0.88
Perceived channel richness	MR	0.92	0.73	0.88
Satisfaction	SE	0.92	0.60	0.90
Intention to continuance	IC	0.91	0.78	0.85

Table 1. ICR, AVE, and Cronbach's Alpha

Combined dataset	EP	ET	EC	MR	SE	IC
EP	**0.82**					
ET	0.12	**0.81**				
EC	0.29	-0.03	**0.83**			
MR	0.43	0.12	0.46	**0.85**		
SE	0.53	0.11	0.40	0.65	**0.78**	
IC	0.47	0.07	0.32	0.65	0.64	**0.88**

Note. Square root of the AVE are the bolded diagonal values.

Table 2. Correlation and Square Root of AVE Values

	EP	ET	EC	MR	SE	IC
ep4	0.90	0.12	0.37	0.45	0.55	0.46
ep6	0.73	0.07	0.09	0.20	0.35	0.35
ep8	0.86	0.15	0.24	0.44	0.50	0.39
ep10	0.84	0.06	0.23	0.33	0.36	0.37
et1	0.10	0.63	-0.04	0.17	0.10	0.03
et2	0.10	0.91	-0.06	0.02	0.06	0.03
et3	0.11	0.88	0.02	0.11	0.12	0.10
ec2	0.18	-0.03	0.80	0.50	0.43	0.30
ec3	0.26	-0.06	0.91	0.35	0.35	0.22
ec4	0.28	-0.10	0.85	0.32	0.25	0.24
ec5	0.21	-0.02	0.90	0.48	0.36	0.36
ec6	0.28	0.10	0.72	0.25	0.26	0.22
mr1	0.30	0.13	0.36	0.80	0.56	0.68
mr2	0.27	0.11	0.42	0.82	0.59	0.53
mr3	0.42	0.09	0.42	0.93	0.55	0.51
mr4	0.49	0.08	0.38	0.90	0.54	0.54
se3	0.38	0.03	0.33	0.57	0.66	0.61
se4	0.44	0.05	0.21	0.51	0.62	0.70
se6	0.41	0.07	0.39	0.37	0.72	0.36
se7	0.46	0.15	0.35	0.55	0.89	0.55
se8	0.47	0.11	0.29	0.49	0.82	0.42
se9	0.34	0.12	0.34	0.49	0.83	0.44
se10	0.43	0.13	0.25	0.44	0.80	0.41
se11	0.42	0.03	0.33	0.66	0.88	0.62
ic1	0.45	0.14	0.30	0.60	0.65	0.94
ic2	0.51	-0.01	0.32	0.62	0.53	0.88
ic3	0.29	0.04	0.24	0.51	0.53	0.85

Table 3. The Result of Factor Analysis

Tests of the Structural Model

The hypotheses were tested by analyzing the structural model. The explanatory power of a structural model is evaluated by R^2 value for the dependent variable (i.e., intention to continuance) which shows 0.47 of R^2 value.

Table 4 presents the results of testing hypotheses for direct effects in the combined dataset (i.e., blog and wiki groups together). An individual's knowledge base can expand his/her perception of channel richness to improve satisfaction with knowledge sharing. A user perceiving the channel rich is likely to be more satisfied with knowledge sharing than others perceiving the same channel lean. Thus, the higher level of the satisfaction translates into stronger intention to continuous knowledge sharing (See Table 4.).

Hypotheses	Path	Path coefficient	S.D.	t-value	Results
H1	SE → IC	0.69**	0.05	13.63	accept
H2	MR → SE	0.66**	0.06	10.31	accept
H3.1	EP → MR	0.33**	0.08	3.96	accept
H3.2	ET → MR	0.14*	0.07	2.09	accept
H3.3	EC → MR	0.37**	0.09	4.05	accept

Note. **. Significant at the level of $p < 0.01$, *. Significant at the level of $p < 0.05$.

Table 4. The Results of Hypotheses for Direct Effects

We suggest some hypotheses that the effects of knowledge-building experiences are moderated by a given channel supporting a specific communication process.

Blog allows limited feedback via replies or trackback under the condition of that original document is fixed, so that changing of the issued knowledge even once is scarcely happened. But, blog in which each user has own channel can support the higher level parallelism. On the other hand, once codified knowledge in a wiki page can be improved by others' contribution, so that it has potential possibilities of modification hereafter. Because wiki in which a user-group has a common channel used by co-participants provide an immediate or rapid feedback function, discussion or negotiation among group members to reach shared understanding can be done efficiently. Thus, blog is appropriate for conveyance whose purpose is to 'exchange' of knowledge and wiki is suitable for convergence whose purpose is 'agreement' on meaning of collaborative knowledge.

To examine the moderating effects of communication process modes, we identified dataset to 2 groups, blog group and wikir group, and ran PLS for each group to compare path coefficient values. The statistical comparison was carried out using t-value suggested by Chin et al. (1996). Table 5 shows the results of related hypotheses testing. The effect of experiences shared with partners is greater in blog, and the effects of experiences about a channel and group task are greater in wiki.

Hypotheses	Path	Statistics	Blog group	Wiki group	Results
H4.1	EP → MR	Path coefficient	0.46	0.12	reject
		S.D.	0.11	0.09	
		t-value	16.79		
H4.2	ET → MR	Path coefficient	0.07	0.29	reject
		S.D.	0.09	0.10	
		t-value	-11.66		
H4.3	EC → MR	Path coefficient	0.31	0.49	accept
		S.D.	0.14	0.09	
		t-value	-7.49		

Table 5. The Results of Hypotheses for Moderating Effects

H4.3 that experiences with a channel will be greater in a channel which supports convergence rather than conveyance was supported. The more knowledgeable a user is about the channel, the faster he can encode and decode knowledge, thus enabling a quick response to shared knowledge and swift construction of collaborative knowledge. So the impact of experiences related to the channel on the perceived channel richness is relatively greater in wiki as it supports fast feedback.

However, H4.1 that the effects of experience with group members will be higher in the channel supporting convergence and H4.2 that the effects of experiences with task topic will be larger in the channel supporting conveyance were rejected. These findings can be interpreted that in blogs the pre-established relationship can be easily transferred to the knowledge network.

Thus, experiences with partners have relatively greater impact in blog where group members form the social relationship via their own. Whereas, more experiences related to the group task require prompt agreement among members on collaborative knowledge by multi-participants' contributions. It appears that wiki with faster feedback functions than blog highlights such the effect.

CONCLSION

Enterprise 2.0 KMS can facilitate the open communication channel for knowledge sharing, in which voluntary participation by members is promoted. Previous studies on knowledge sharing through Web 2.0 technologies have focused on the motivation of contributors. They do not reflect the importance of mediated environments by the technologies, enabling actual knowledge sharing.

Under the perspective of CMC, this study attempts to identify the factors which have influence on users' continuous knowledge sharing. The reason why we keep focusing on the continuance of users is that success or failure of Enterprise 2.0 KMS absolutely depends on the continuous knowledge sharing of organization members. In particular, we consider new communication process modes as a moderator.

Users' satisfaction with knowledge sharing can be improved by expanding their perception of richness of a channel used for knowledge sharing. Thus, it eventually promotes the intention to continuous knowledge sharing. In addition, it is shown that the choice of an adequate channel which supports a certain communication process can expand users' perceptions of channel richness.

Such theoretical research will contribute practically at the point of time when organizations attempts to develop the Enterprise 2.0 strategy on the basis of members' participation and contribution. It is possible for an organization to design new systems or to choose more effective technologies by considering members' internal factors and various experiences. For example, when collaboration is required between organizations or departments, or professional groups such as R&D department generate new idea or technologies, it is more efficient to use a wiki-applied system to accelerate the efficiency of the task. Meanwhile, if the project should be performed while maintaining a work group continuously or when members progress a task in unacquainted field, the use of blog technologies can possibly elevate the performance of the task. Otherwise, it is possible to constitute a team or a group which can lift up the efficiency of a given system. The result of this study can provide concrete guideline for successful execution of Enterprise 2.0.

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