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UNDERSTANDING ONLINE KNOWLEDGE CONTRIBUTION IN SOCIAL LEARNING PERSPECTIVE

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Abstract

Online open knowledge sharing is the idea that the Internet can promote the aggregation and dissemination of useful knowledge between a potentially large number of people. Starting from the knowledge sharing idea, various types of online open knowledge sharing services have provided the central platform for users to interact with each other, share their knowledge, and even jointly create new knowledge. In this study, we derive two research questions: 1) what framework can better explain online knowledge contribution? and 2) what factors influence online knowledge contribution? The study draws on both social learning theory and the social model of knowledge creation to investigate the overall antecedents of knowledge contribution and to examine three facets, user-oriented, service-oriented, and community-oriented knowledge contribution behaviour. In the study, we examine which knowledge sharing antecedents motivate people to contribute to knowledge sharing in the framework based on the social model of knowledge creation. We then verify each variable and hypothesis using a survey and the PLS analysis. This study uses social learning perspective to include all three aspects of knowledge sharing behaviour: personal, community-related, and service-related antecedents. With this new perspective, while previous studies have focused on personal cognitive factors in this area, this study examines the integrative influence of factors from social learning and social knowledge creation antecedents. In addition, our findings offer guidance and insights for knowledge sharing service practitioners and managers who are trying to encourage users' contributions.

Keywords: Online Knowledge Contribution, Online Knowledge Sharing Service, Social Learning Theory, Social Model of Knowledge Creation

1 Introduction

Online open knowledge sharing is the idea that the Internet can promote the aggregation and dissemination of useful knowledge from a potentially large number of people (Davis, 2011). Starting from the knowledge sharing idea, various types of online open knowledge sharing services have provided the central platform for users to interact with each other, share their knowledge, and even jointly create new knowledge; examples of such services are Wikipedia (<http://www.wikipedia.org>), an open collaborative encyclopedia, Naver Knowledge In (<http://kin.naver.com>), a Q&A service, and Stack Exchange (<http://stackexchange.com>), a network for sharing knowledge.

Since sharing knowledge in these services is voluntary and involves no material compensation, many studies have focused on why individuals participate in knowledge sharing and ways to encourage them to contribute more actively. Some studies, especially in the context of organizational knowledge sharing, have used economic and social exchange theory to explain knowledge sharing behaviour. In these studies, individuals are supposed to behave by rational self-interest, and thus rewards and incentive systems are considered important factors for knowledge sharing (Bock & Kim, 2001). However, in online open knowledge sharing services, there are no concrete extrinsic rewards such as monetary rewards or promotion unlike the rewards in organizations. Other studies have used social capital theory to understand knowledge sharing behaviour. Social capital theory can explain the multidimensional characteristic of knowledge sharing behaviour, which involves contextual, cognitive, and communicative skills. Previous studies have focused on the fragmentary dimension of knowledge sharing behaviour such as personal or social one, and hence researchers have suggested that a theoretical platform that can investigate overall aspects of behaviour should be explored (Widén-wulff & Ginman, 2004; Chang & Chuang, 2011). In addition, social capital theory, which has been widely used to explain knowledge sharing behaviour, does not explain active knowledge sharing in countries with relatively low social capital. Thus, in this study, we examine the factors affecting knowledge contribution in online open knowledge sharing services, supplementing existing studies with a integrative research framework and additional factors.

2 Literature Review

2.1 Online Knowledge Sharing Services

Internet-based information and communication technologies have rapidly developed and so have innovative online applications. The development of the Internet supports the evolution of online services and communities by providing facilitating conditions for communication, interaction, and collaboration and enabling crowds to participate and collaborate (Acquisti & Gross, 2006). Among those services, online knowledge sharing services are a prominent example that encourages users to participate, helps users to satisfy their appetite for knowledge, and creates integrative and sometimes innovative knowledge (Yang & Lai, 2011).

An online open knowledge sharing service is defined as online social platforms for people who share their knowledge and experience and interact with one another with common interests (Kim, 2009). In the perspective of interpersonal communities, an online open knowledge sharing service is an online social network where any of the online crowds can join in, interact to share information and knowledge, and engage in social interactions (Chiu et al., 2006). Online open knowledge sharing services enable every crowd on the Internet to participate in knowledge sharing by overcoming the geographic limitations and providing open accessibility. In addition, online knowledge sharing

services are characterized by weak-tie relationships from computer-mediated virtual connections, geographic distance, few extrinsic material rewards, and voluntary basis (Chiu et al., 2010).

The effects of online open knowledge sharing services are paradoxical. Though online open knowledge sharing services offer an effective platform for attaining reliable knowledge and creating useful knowledge, some previous studies maintain that giving away knowledge eventually causes the possessor to lose his or her unique value relative to what others know and benefits all others except the contributor (Thibaut & Kelley 1959; Thorn & Connolly 1987). Moreover, there are no monetary incentives for knowledge contributions on the services and the relationship on the Internet is of weak-tie, which may not be long-lasting. Therefore, the keys for a successful online open knowledge sharing service are the supply of knowledge, the willingness to share knowledge with other members, and the ways and strategies to attract more crowds to contribute to the knowledge sharing. These are significant issues and need to be researched and understood (Kittur & Kraut, 2008; Chiu et al., 2010).

2.2 Knowledge Contribution

Knowledge is defined as “justified true belief”, and it is characterized as being dynamic because it is created in social interaction. There are two types of knowledge: tacit and explicit knowledge. Tacit knowledge is highly personal and hard to formalize; it is categorized as subjective insights, intuitions, and hunches. Explicit knowledge can be expressed in formal and systematic language and shared in the form of data, scientific formulae, specifications, manuals and such so that it can be processed, transmitted and stored relatively easily (Nonaka et al., 2000). Tacit and explicit knowledge bi-directionally affect each other in the cycle of knowledge creation, which is internalizations, socializations, externalizations, and combinations. In this cycle, knowledge sharing can occur; individuals mutually exchange their tacit and explicit knowledge, make it socialized and externalized, and jointly combine the shared knowledge into internalized knowledge (Van den Hooff & De Ridder, 2004). Tacit knowledge is internal to oneself so it can only be shared by interpersonal means, while explicit knowledge can be delivered via technology-driven or structured processes (Chang & Chuang, 2011). As we can assume from the definition of knowledge, knowledge is largely created through social learning process. Brown and Duguid (2001) presented the notion of knowledge flow in which individuals exchange knowledge with one another. In this flow of knowledge exchange, communities and network connections are created, and knowledge contributors, seekers, organizers, etc become major actors.

In this sense, we can understand the Internet as the broader concept of networks of practice in which people share knowledge through Web-based technologies (Wasko & Faraj, 2005). Here, knowledge contribution, which is also called knowledge sharing, knowledge donation, or knowledge posting, is defined as providing task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures (Ryu et al., 2003; Pulakos et al., 2003; Cummings, 2004).

2.3 Knowledge Contribution Antecedents

Recently, a great number of studies have attempted to explain the reason people contribute knowledge and to determine the significant factors in successful knowledge sharing. In an economic perspective, individuals are regarded as rational and self-interested parties, and studies have emphasized the importance of extrinsic rewards such as monetary incentives, or job promotion (Wasko & Fraraj, 2000; Bock & Kim, 2001; Bock et al., 2005; Kankanhalli et al., 2005; Wasko & Fraraj, 2005; Quigley et al. 2007). Developing from this previous economic perspective, the cost-benefit relation and exchange theory have been used to explain the knowledge sharing behaviour (Ju et al., 2010). In addition to the rewards and incentive systems, various motivations have also been investigated theoretically (Bartol, 2002; Damodaran, 2000) and empirically (Weir, 2005, Yang, 2004), and revealed the specific constructs for motivations, such as monetary, social, altruistic, heuristic, and

ideological. Some other studies have also focused on the interpersonal relations that can shape knowledge-sharing behaviour such as the social capital concept (Wasko, 2005; Chiu et al., 2006; Chang & Chuang, 2011), social cognition (Chiu et al., 2006; Hsu et al., 2007), trust (Ridings et al., 2002), satisfaction (Chen, 2007), social network (Wasko et al., 2004), or attachment to collective action (Wasko et al., 2004; Wasko & Faraj, 2005; Cheung & Lee, 2010) to understand the voluntary knowledge contribution (Zhang et al., 2010).

Table 1 shows knowledge contribution antecedents from studies focusing on online settings. We sorted the knowledge contribution antecedents into personal, social, and service dimensions. The context row indicates the context of the study and the last row presents extra variables or remarks to be mentioned. Among the previous papers, any studies have researched the model that integrates all three dimensions of potential affecting factors.

Reference	Context	Personal	Social	Service	Extra variables or remarks
Wasko & Faraj, 2005	Online Professional Community	○	○		Social Capital
Hsu et al., 2007	Online Discussion Forum	○	○		Trust, Outcome expectation
Hsu & Lin, 2008	Online Blog	○	○	○	TRA, TAM, TPB
Li et al, 2008	Online Community		○		Social Exchange Theory
Lin, 2008	Online Community		○	○	IS Success Model
Kim, 2009	Online Community	○	○		Motivation
Yang & Shim, 2009	Online Knowledge Sharing Service		○	○	Web information Quality
Su et al., 2010	Online Education			○	TAM
Cho et al., 2010	Wikipedia	○	○		TPB
Chen & Hung, 2010	Online Knowledge Sharing Service	○	○		TPB
Yang & Lai, 2010	Wikipedia	○		○	Information & System Quality
Zhang et al., 2010	Online Community	○	○		Psychological Safety
Ma & Yuen, 2011	E-Learning Platform		○		Social Attachment

Table 1. Knowledge Sharing Antecedents (Online Context)

3 Theoretical Background

3.1 Conceptual Framework

The foundation of our conceptual framework comprises three elements: the components from social learning theory, the social model of knowledge creation, and the concept of motivation (see Figure 1). By integrating the factors from social learning theory and the social model of knowledge creation, we draw on three components that synthetically affect knowledge contribution: service, person, and community. The concept of motivation is considered to mediate between those three components and behavioural intention to contribute to the knowledge sharing services; this mediation is supported by motivation models, self determination theory, and activation theory. Thus, our theoretical framework is grounded in the proposition that individual perception of factors related to service, person, and community arouses motivation and motivation activates behavioural intentions to contribute to online knowledge sharing services..

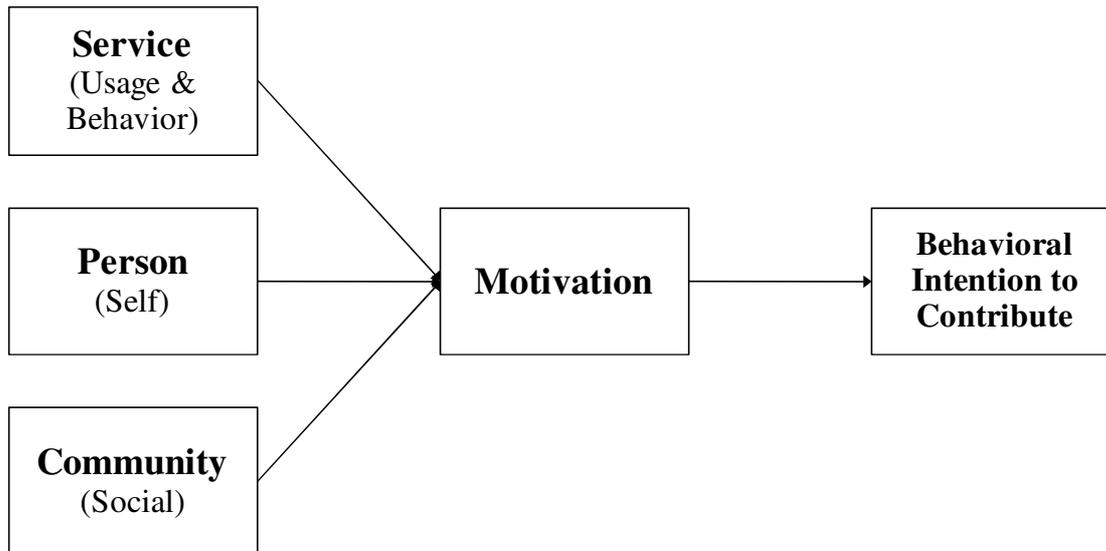


Figure 1. Conceptual Framework

3.2 Social Learning Theory

Social learning theory has helped with understanding individuals' behaviour within social settings (Kytte, 1978). Unlike individual learning theory, which restricted the idea of learning to something taking place inside individuals' minds, social learning theory explains behavioural development through the processes of participation and interaction (Gherardi et al., 1998). In an online environment, social learning theory is being studied as a desirable way of explaining adoption, especially when there exist certain needs in online social interaction (Tu, 2000). Therefore, it is more appropriate to utilize social learning theory to explain online knowledge contributions, which are collective and participative, than to use individual learning theory, which is based only on individual cognitive factors.

3.3 Social Model of Knowledge Creation

A social model of knowledge creation provides the pre-requisite process for genuine knowledge sharing, in which individual-level knowledge moves to wider community-level knowledge within social interaction (Attwell & Brown, 2000). With the development of information and communication technology (ICT), online knowledge sharing has become more active, as ICT platforms support virtual knowledge sharing environments such as online knowledge sharing services (Attwell, 2009).

The social model of knowledge creation and the social knowledge management system have been suggested by Attwell (2009) with the development of Freefolio, a knowledge management system. The model and the system were developed based on Vygotsky's theoretical framework, the activity theory, which proposes that human activities are complex, socially situated phenomena and that social interaction plays a fundamental role in the development of cognition. According to Vygotsky (1978), interactions with the social environment are important ways of facilitating individual cognitive growth and knowledge acquisition. Based on the Vygotsky's proposition, Bryant et al. (2005) proposed a model of activity system and Elferink (2009) suggested a platform of social knowledge creation and management. Both models are composed of three main factors and three sub-factors: subject, community, object (in the proposition of Elferink, person, community, service); rules, tools, and work traits. In this model, the subject is a person or group engaged in the activities; community is the social context within which people around the subject are involved; and the object is the activity itself.

Division of Labor is defined as the trait of activities within the balance of people and artifacts associated with the activities; tools are defined as the artifacts used for performing the activities; and rules are defined as the guidelines and shared beliefs for activities and behaviours (Bryant et al., 2005). In other words, people do things with tools within a system of rules, and here knowledge is constructed; communities exist for some works with rules, and here scalable social networking is established; services that have certain work traits are dealt with tools, and here information is disseminated.

By investigating this model and social learning theory together, we found that the main factors of person (subject), community (environment), and service (object, behaviour) overlap. Thus, based on the two theories and on a review of literature on the antecedents of knowledge sharing, we suggest a comprehensive perspective of factors affecting social knowledge sharing (see Figure 2).

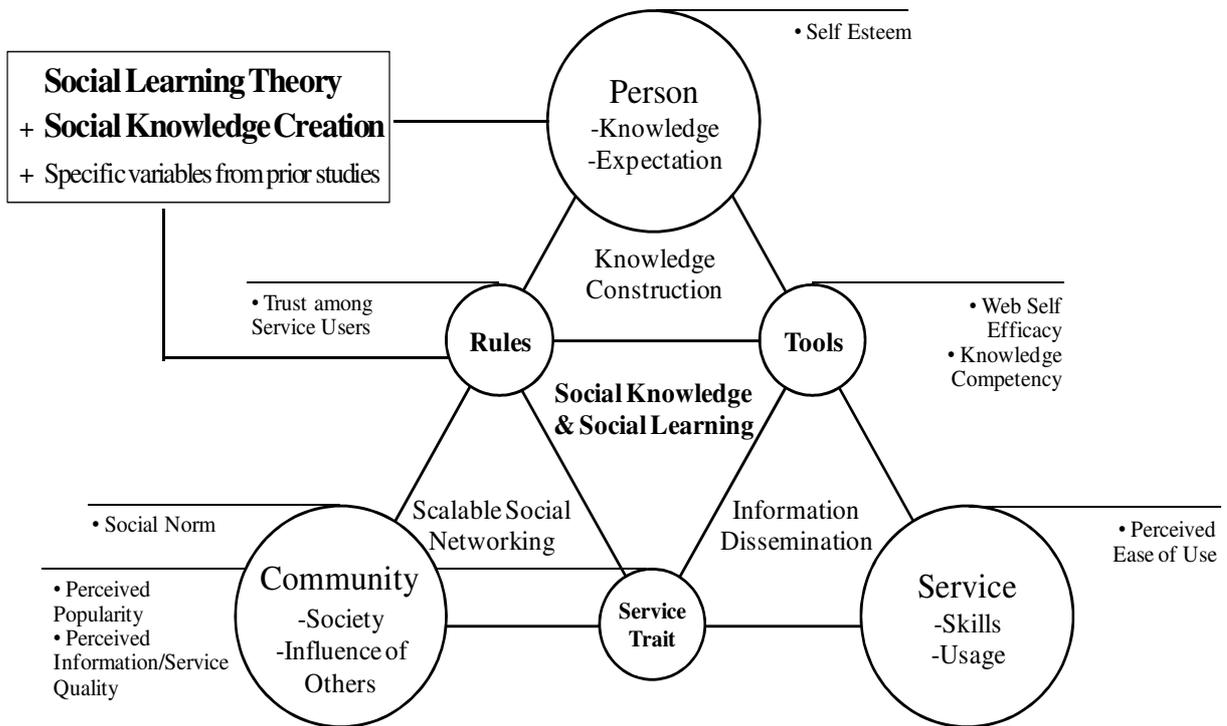


Figure 2. Comprehensive Factors Related to Knowledge Sharing.

4 Research Model and Hypotheses

Based on our conceptual framework and theoretical support to the effect that personal, behavioural, and environmental factors affect motivation and that this motivates behaviour, we have developed a research model and propose the following hypotheses (see Figure 3 and below).

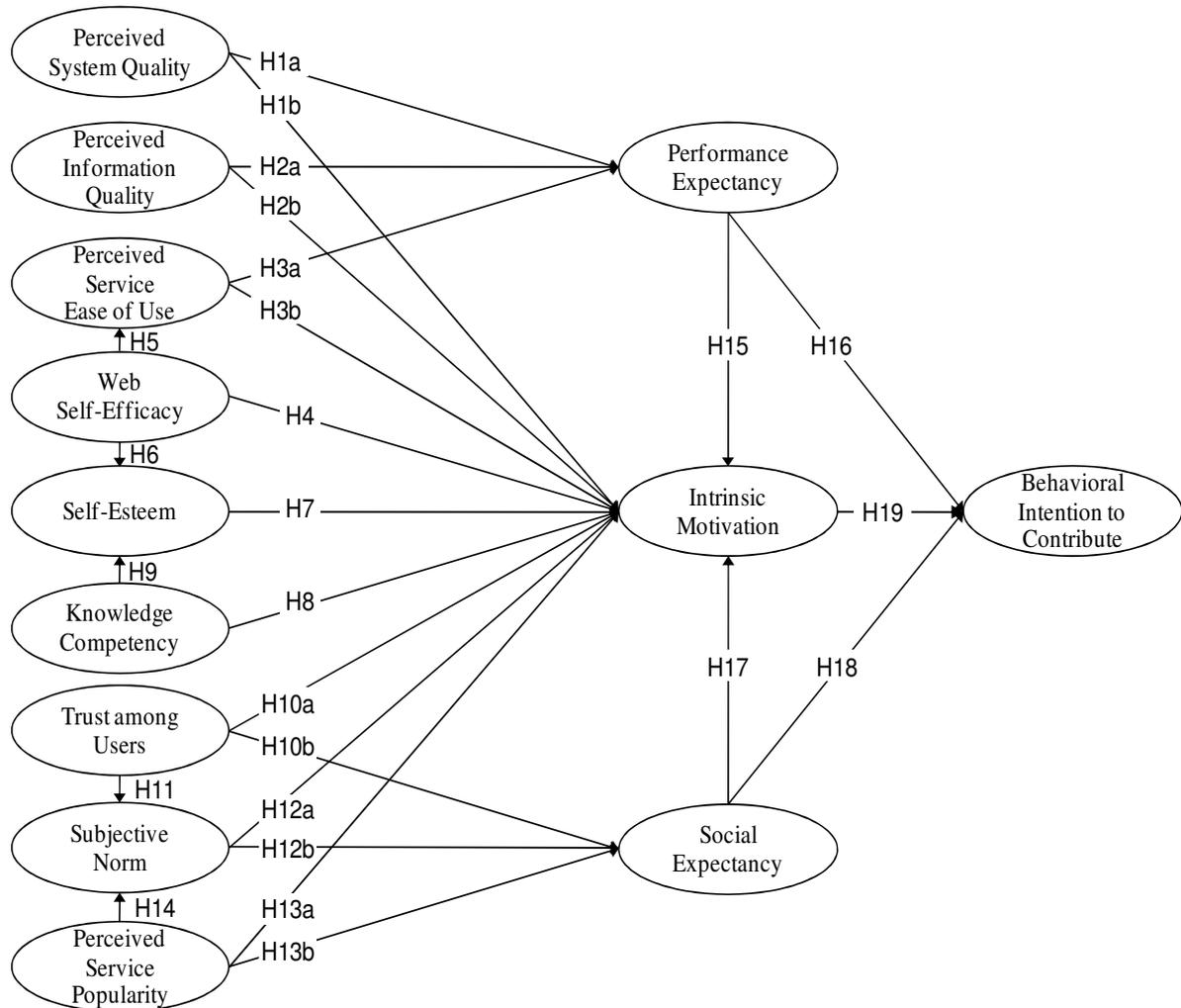


Figure 3. Research Model

- Knowledge Sharing Antecedents:
 - H1a. Higher perceived system quality leads to a greater level of performance expectancy.
 - H1b. Higher perceived system quality leads to a greater level of intrinsic motivation.
 - H2a. Higher perceived information quality leads to a greater level of performance expectancy.
 - H2b. Higher perceived information quality leads to a greater level of intrinsic motivation.
 - H3a. Greater perceived service ease of use leads to a greater level of performance expectancy.
 - H3b. Greater perceived service ease of use leads to a greater level of intrinsic motivation.
 - H4. Higher Web self-efficacy leads to a greater level of intrinsic motivation.
 - H5. Higher Web self-efficacy leads to greater perceived service ease of use.
 - H6. Higher Web self-efficacy leads to higher self-esteem.
 - H7. Higher self-esteem leads to a greater level of intrinsic motivation.
 - H8. Greater knowledge competency leads to a greater level of intrinsic motivation.
 - H9. Greater knowledge competency leads to higher self-esteem.
 - H10a. Greater trust among service users leads to greater level of intrinsic motivation.
 - H10b. Greater trust among service users leads to a greater level of social expectancy.
 - H11. Greater trust among service users leads to a more positive subjective norm for online knowledge contribution.
 - H12a. A more positive subjective norm for online knowledge contribution leads to greater level of intrinsic motivation.

- H12b. A more positive subjective norm for online knowledge contribution leads to greater level of social expectancy.
- H13a. Greater perceived service popularity leads to a greater level of intrinsic motivation
- H13b. Greater perceived service popularity leads to a greater level of social expectancy.
- H14. Greater perceived service popularity leads to a more positive subjective norm for online knowledge contribution.
- Motivation Factors:
 - H15. Performance expectancy positively influences intrinsic motivation.
 - H16. Performance expectancy positively influences behavioural intention to contribute to online knowledge sharing services.
 - H17. Social expectancy positively influences intrinsic motivation.
 - H18. Social expectancy positively influences behavioural intention to contribute to online knowledge sharing services.
 - H19. Intrinsic motivation positively influences behavioural intention to contribute to online knowledge sharing services.

5 Research Method

To test our model and hypotheses, we adopted a survey method for data collection. The primary sample was online knowledge sharing contributors. A survey instrument was developed by applying measures that had been validated in prior works. Some modifications were made to fit them to the context of online knowledge contribution. The survey participants in this study were Korean, and thus the questionnaire was translated into Korean and a panel of experts in the Korean language and the Korean IT industry examined the face validity of the items. The survey items were asked with a five-point Likert scale ranging from “strongly disagree (1)” to “strongly agree (5)”. For checking the adequacy of instruments and mitigating unforeseen problems, we conducted a pilot test with 35 subjects who had contributed to Wikipedia. In this pretest, we prepared a blank space for commenting or asking questions regarding the survey. The results of pilot test demonstrated that most items and constructs had sufficient reliability and validity for an empirical analysis. The participants commented on comprehension issues for three items and this led to further item eliminations or modification, and the number of final items is 47.

The finalized survey questionnaire was distributed to Korean *Wikipedia*, *Knowledge In*, and *Daum Review* contributors on the Internet. These sites were chosen because KISA (Korea Internet Security Agency) suggested that they are popular and effective Internet knowledge sharing services (KISA Cyber Internet History Museum, 2009). The data were collected for a month (May, 2011). The survey data were analyzed using the partial least square method, a component-based structural equation modelling, by SPSS 18.0 and SmartPLS 2.0.M3

6 Data Analyses Results

6.1 Descriptive Statistics and Measurement Model

Descriptive statistics of each item confirm that our sample responded positively to most of the constructs on average; all the means of each item are greater than 2.9 out of 5. Among the responses of positive propensity, perceived information quality (PIQ) and trust among service users (TR) have the least score relatively, but those items still were above 2.9 out of 5

For the measurement model, first, Cronbach's α was used to assess the internal reliability. The value of Cronbach's α ranged from 0.70 to 0.92, which exceeds the Nunnally's criterion of 0.70 (Nunnally, 1978). To check the convergent validity, we conducted a confirmatory factor analysis and checked the parameter estimates and their associated t-values. All the measurement items were valid ($p < 0.001$) and higher than 0.7, which also demonstrates unidimensionality. We also checked the Composite Reliability (CR); the lowest value of CR was above 0.83, exceeding the recommended value of 0.7 (Hair et al., 1998). The Average Variance Extracted (AVE) was also calculated and each AVE was above 0.6, exceeding the threshold value of 0.5 recommended by Fornell and Larcker (1981).

The discriminant validity is assessed to evaluate whether the measures of the constructs are distinct and the indicators are loaded on the appropriate construct. The square root of the AVE is checked to be greater than all the inter-construct correlations, which presents evidence of sufficient discriminant validity (Chin, 1998). In the analysis, the diagonal elements, the square root of AVE, are greater than their corresponding off-diagonal elements

6.2 Structural Model

Figure 4 presents the estimates obtained from the PLS analysis. The detailed hypotheses testing results are presented in Table 2. Among the 25 hypotheses, most are supported except H12a, 13a, 16, and 18. The R^2 for the final dependent variable, behavioural intention to contribute (BI), is 0.63. Also, the R^2 for the intrinsic motivation (IM), which is the most important independent factor influencing behavioural intention, is 0.82. The R^2 value indicates that the model explains a substantial amount of variance for the online knowledge contribution.

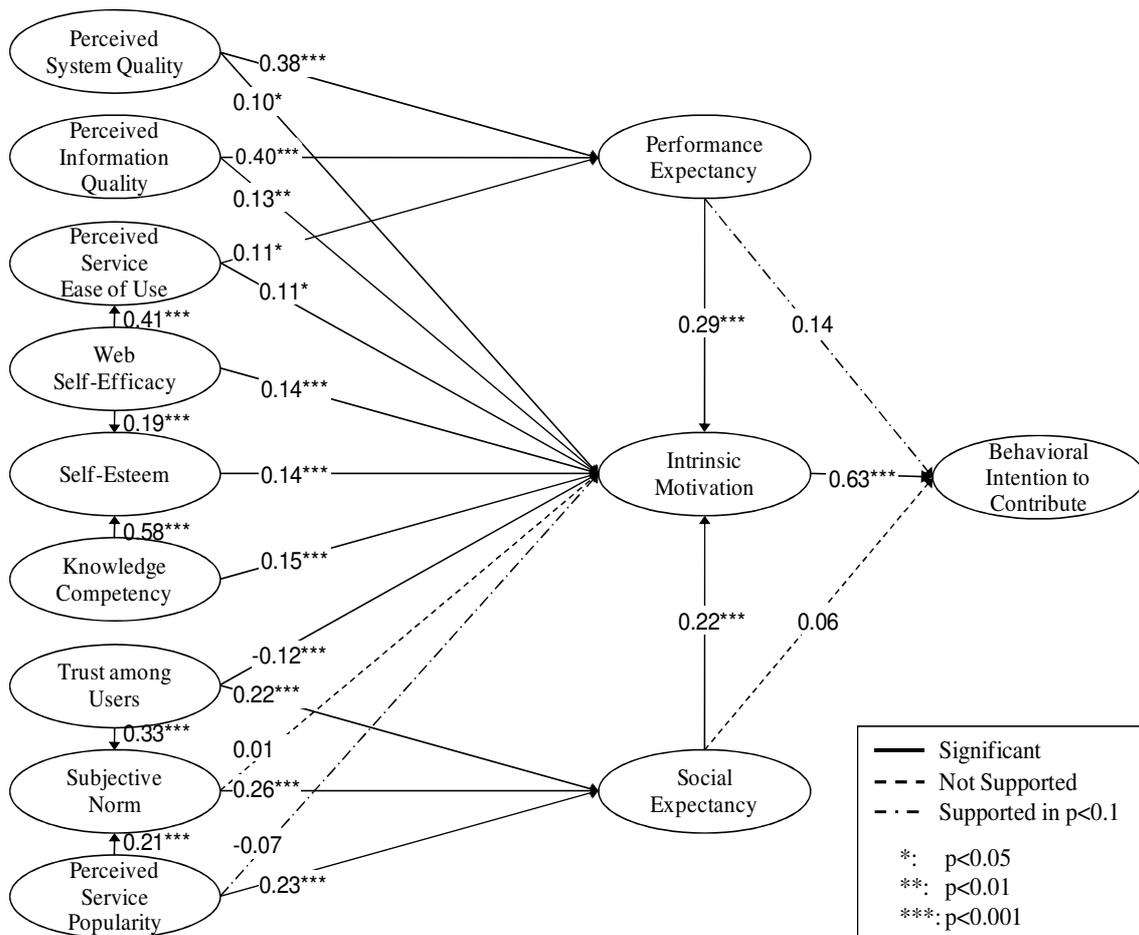


Figure 4. Results of the PLS Analysis

	Effect	Result (two tails)		Hypotheses	Effect
		P.C.	S.E.	<i>t</i> -value	
H1a	PSQ → PE	0.38	0.07	5.26	Supported (p <0.001) ***
H1b	PSQ → IM	0.10	0.05	2.12	Supported (p <0.05) *
H2a	PIQ → PE	0.40	0.05	7.75	Supported (p <0.001) ***
H2b	PIQ → IM	0.13	0.04	3.11	Supported (p <0.01) **
H3a	PSEU → PE	0.11	0.06	1.96	Supported (p <0.05) *
H3b	PSEU → IM	0.11	0.05	2.15	Supported (p <0.05) *
H4	WSE → IM	0.14	0.04	3.29	Supported (p <0.001) ***
H5	WSE → PSEU	0.41	0.06	7.02	Supported (p <0.001) ***
H6	WSE → SE	0.19	0.05	3.65	Supported (p <0.001) ***
H7	SE → IM	0.14	0.04	3.50	Supported (p <0.001) ***
H8	KC → IM	0.15	0.06	2.62	Supported (p <0.001) ***
H9	KC → SE	0.58	0.05	12.24	Supported (p <0.001) ***
H10a	TR → IM	-0.12	0.04	3.31	Supported (p <0.001) ***
H10b	TR → SoE	0.22	0.05	4.11	Supported (p <0.001) ***
H11	TR → SN	0.33	0.07	5.03	Supported (p <0.001) ***
H12a	SN → IM	0.01	0.03	0.39	Not supported
H12b	SN → SoE	0.26	0.06	4.03	Supported (p <0.001) ***
H13a	PSP → IM	-0.07	0.04	1.87	Not supported (p<0.1)
H13b	PSP → SoE	0.23	0.06	3.79	Supported (p <0.001) ***
H14	PSP → SN	0.21	0.06	3.33	Supported (p <0.001) ***
H15	PE → IM	0.29	0.06	4.77	Supported (p <0.001) ***
H16	PE → BI	0.14	0.08	1.66	Not supported (p<0.1)
H17	SoE → IM	0.22	0.04	5.45	Supported (p <0.001) ***
H18	SoE → BI	0.06	0.07	0.85	Not supported
H19	IM → BI	0.63	0.09	6.81	Supported (p <0.001) ***
H1a	PSQ → PE	0.38	0.07	5.26	Supported (p <0.001) ***

Table 2. Hypotheses Testing Results

7 Discussion

Our main objective was to understand why people contribute their knowledge in online knowledge sharing services in terms of social learning and social knowledge creation. On the basis of the social knowledge creation model based on social learning theory and the activity system, three facets of effective elements are suggested and verified in a structural model: first, a subject is a person or group actually performing activities; second, a community is a society in which a subject and people around the subject are included; third, an object is the service or activity itself (Bryant et al., 2005; Attwell,

2009; Elferink, 2009). Through the variables from this perspective, we expect to better explain the process of various antecedents and motivations of knowledge contribution behaviour, which is considered complex because of its characteristics of voluntarism and collectivism. In the research model, we argue that perceptions of service-oriented, personal, and community-related factors influence intrinsic and extrinsic motivations, and these motivations affect behavioural intention to contribute knowledge in online knowledge sharing services.

This paper makes four key contributions. First, it uses social learning and social knowledge creation perspective to include personal, community-related, and service-related antecedents. With this new perspective, we expect to explain a part of knowledge contribution behaviour that has not yet been explained in previous studies such as the use of cost-benefit exchange theory or the concept of social capital. Second, while previous studies have focused on personal cognition or social networks, this study examines the integrative influence of social learning and social knowledge creation antecedents. Third, this study applies motivational factors to mediate the integrative preceding factors and knowledge contribution behaviour by working as one's mental driving force. With this improved approach, the model can explain the relationships of various factors connected to behaviour, mental arousal, and actual behaviour. Finally, to the best of the authors' knowledge, this is the first study that applies social learning theory and a social knowledge creation model to the study of online knowledge contribution. By applying this approach, the study provides a better rationale for setting individual, service, and community as the key preceding factors of knowledge contribution behaviour.

Practically, our findings offer guidance and insights for knowledge sharing service practitioners and managers who are trying to encourage users' contributions. As the number of users' knowledge contribution highly affects the quantity and quality of knowledge and contents in the service, encouraging contributors is an important issue. Through this study, we suggest which motivation factors user service managers need to focus on to encourage more participation. Moreover, the factors that practitioners may also focus on are settled into shape. Especially, managers need to strive to increase contributors' intrinsic motivations such as enjoyment, pleasure, and altruism. In the service-related factors, perceived service quality is suggested to be an important factor affecting performance expectancy. IT practitioners need to enhance and maintain basic information and system qualities. Knowledge sharing services could provide customization or personalization of services for contributors in order for contributors to perceive better efficacy and competency of using the services. In terms of community-related factors, trust, subjective norm, and perceived popularity are all proposed to be significant factors. Managers of knowledge sharing services may need to try to provide a community club or board among contributors so that contributors can feel a number of people are also using the services and the activity is socially approved.

While this study suggests and verifies the integrative model for knowledge contribution in online knowledge sharing services, there are some limitations and unanswered questions to be mentioned. Though we randomly collected online survey data, there are some limitations in the sample composition. Most of the respondents (80.7%) were male. There may be some differences in the behavior of female users. As more and more female users are participating in online services, the gender difference or non-difference may be studied in the future. Moreover, 71.2% of respondents of the survey were students: there may be some distinct characteristics of professional users who contribute their knowledge about their professional areas. In addition, the study was conducted in Korea, where ICT communities and user participation are relatively active and where the culture is relatively group-oriented. In the country, where ICT communities are not very popular or where the culture is more individual-oriented, the result is likely to be different (Gelfand et al., 2007; Chen & Hung, 2010; Chiu et al., 2011).

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