Establishing Knowledge Sharing in Virtual Community through Trust, Self-efficacy and IS Success Model

Chien-Chih Huang\textsuperscript{a}, Chia-Hui Yen\textsuperscript{b}, Jen Chiu\textsuperscript{c}, Wen-Jin Hwang\textsuperscript{d}, Meng-Hsiang Hsu\textsuperscript{e}.

\textsuperscript{a,c,d,e} Department of Information Management, National Kaohsiung First University of Science & Technology, 2 Juoyue Road, Nantz District, Kaohsiung 811, Taiwan R.O.C. u9224815|u9224702|u9328907|mhhsu@ccms.nkfust.edu.tw

\textsuperscript{b} Department of Information Management, National Taiwan University of Science and Technology, No. 43, Sec.4, Keelung Rd., Taipei, 106, Taiwan, R.O.C. D9109206@mail.ntust.edu.tw

Abstract

Evaluation of the success of professional virtual communities (VCs) has been the focus of many organizations. However, there are still few empirical studies conducted to examine online knowledge sharing behavior that has been thought as the most important element for VC success. In this study, by integrating two schools of thoughts (trust theory and self-efficacy expectation) with IS Success Model, this study proposed a successful model of professional VC from both the environmental influences and personal cognitive factors. Eleven research hypotheses derived from this integrated model are then evaluated by structural equation modeling using a field survey of 274 complete questionnaires of nine types of VCs. The results indicated that knowledge sharing behavior is influenced by intention to share knowledge, knowledge sharing self-efficacy, and affective-based trust.

Keywords: Knowledge Sharing Behavior, Self-efficacy, Trust, Virtual Community Success Model.

1. Introduction

Virtual community (VC) of a professional society (i.e., virtual community of practice: CoP) is an online place where people with common interests, background and goals to share medical affliction, personal experience, or develop relationships. The function of a professional virtual community is to enable members of the community to learn from, contribute to, and collectively build upon the professionals’ knowledge and to improve each other’s task without the expense and trouble of relocating members (Kardaras et al. 2003; Piccoli et al. 2003). Therefore, community of practice has been recognized by many organizations as a valuable system that holds the key to knowledge management (Wenger & Snyder 2000) and it has begun to be supported with the development and growth to meet their business needs and objectives (Gongla and Rizzuto 2001).

Significant progress has been made over the last decade in assessing the successful knowledge management system (KMS) model (Jennex and Olfman 2004; Gold et al. 2001).
In particular, substantial theoretical and empirical support has recently generalized Delone and Mclean's (1992) IS success model as an assessment of the KMS success. For example, Maier (2002) extends the IS success model for KMS success by adding two constructs: knowledge-specific service and impact on collectives of people. Jennex and Olfman (2003) applied IS success model to KMS to evaluate success in terms of system quality, knowledge quality, use/user satisfaction, perceived benefit, and net benefits. Finally, by combining IS success model with Markus’s (2001) knowledge reusability concept, Qian and Bock (2005) proposed a knowledge repository systems (KRS) model.

However, due to the nature of virtual community, two additional points of view—environmental perspective and knowledge producer’s capability—should also be considered in order to successfully implement KMS, otherwise “build it and they will come” and “technology can replace face-to-face interaction” were the myths of knowledge sharing (Dixon 2000). As Coleman (1988) indicated that “if you are looking at collaboration and knowledge sharing, try to deal with the people/culture issues, the hard stuff, first.” Organizational and cultural issues associated with user motivation to share and use knowledge are to be the most significant for a KMS (Alavi and Leidner 1999).

As for the environmental perspective, since people often know more than they can tell (Polanyi 1983, p4), knowledge sharing is a process of social interaction. Only people working together makes the processes of knowledge sharing happen—trust should be the defining attribute of the relationship. Being a highly complex and multi-dimensional phenomenon (Lewis and Weigert 1985; Butler 1991), trust is an implicit set of beliefs that the other party will refrain from opportunistic behavior and will not take advantage of the situation (Hosmer 1995). Drawing from this proposition, trust improves the quality of dialogue and discussions (Ichijo et al. 2000); in other words, trust encouraged knowledge sharing.

Moreover, in addition to trust that fosters people’s willingness to share knowledge, their capabilities of contributing, combining, and assimilating the knowledge is also an important variable in knowledge sharing. For example, by studying ten small technology firms, Koskinen (2001) found the ability to identify, capture, and transfer critical tacit knowledge is the key to the success of a KMS. However, complexity and knowledge barriers to the exchange of existing knowledge among employees may be construed as self-efficacy deficits (Bandura 1997). Self-efficacy is the “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura 1997, p.3). For knowledge sharing practice, perceived self-efficacy is important since successful knowledge sharing requires behavioral modification (Ruggles 1998).

As a result, with a theoretical extension of the IS success model by including key determinants of the environmental influences (trust theory) and knowledge producers’ capabilities (self-efficacy beliefs), the goal of this study is to examine and to develop an
understanding of how these factors determine one’s knowledge-sharing behavior in virtual communities from both social and cognitive perspectives. In addition, this study aimed at examining the nature of trust, dividing it into five types, and then discussing their casual relationship as trust building process — economic-based, technological-based, managerial-based, behavioral-based and affective-based trust.

2. Theoretical Background

2.1 Multidimensional Trust in Virtual Communities

Due to the nature of virtual community, trust has been recognized as a critical factor in fostering the voluntary online cooperation between strangers (Ridings et al. 2002). Only trust can prevent the geographical distances of members and develop successful virtual community (Jarvenpaa and Leidner 1999). However, concluded from several past researches, trust is a highly complex and multi-dimensional phenomenon (Abrams et al. 2003; Gefen et al. 2003; Kanawattanachai 2002; McAllister 1995; Ratnasingam 2005; Ridings et al. 2002). Accordingly, this study divides trust into five types with reference to these studies—economic-based, technological-based, managerial-based, behavioral-based and affective-based trust. Economic-based trust can be shaped by rational assessments of the costs and benefits of another party cooperating in the relationship. Thus, we define economic-based trust as “members trust toward virtual community because they will decrease cost and gain benefit in time and knowledge” (Ratnasingam 2005). Secondly, according to Ratnasingam (2005), technological-based trust refers to the subjective probability by which an organization assesses that the underlying technology infrastructure and control mechanisms are capable of facilitating transactions according to its confident expectations. Thus, we define technological-based trust as members trust toward virtual community because of security and technology mechanisms to ensure well function in web site. Third, managerial-based trust, like the nature of technological-based trust, could build through policies, procedures and high quality standards that ensure smooth functioning of it (Ratnasingam 2005). Thus, we define managerial-based trust as members trust toward virtual community because of policies and regulations to ensure well function in web site. Fourth, behavior-based trust is that “we choose whom we will trust in which respects and under what circumstances, and we base the choice on what we take to be ‘good reasons’, constituting evidence of trustworthiness” (Lewis and Wiegert 1985, p.970). Thus, we define behavior-based trust as trust between members because of their ability and competence to ensure accuracy, soundness and reliability of information that members give and get. Finally, affective-based trust consists of the emotional bonds between individuals. People make emotional investments in trust relationships, express genuine care and concern for the welfare of partners, believe in the intrinsic virtue of such relationships, and believe that these sentiments are reciprocated (McAllister 1995). Thus, we define affective-based trust
as trust between members because of their benevolence and integrity to share emotion and reciprocity online.

### 2.2 IS Success Model in Virtual Communities

From a comprehensive review and integration of many research studies that used some form of system success as a dependent variable, DeLone & McLean (1992) propose an IS success model including six major constructs as a scheme for categorizing the multitude of IS success. System Quality and Information Quality singularly and jointly affect both Use and User Satisfaction. Then, the amount of Use can affect the degree of User Satisfaction as well as the reverse being true. Finally, both Use and User Satisfaction further produce an Individual Impact, which directly produces an Organizational Impact.

Although IS success model showed a multi-step process leading from the quality of a system and its information to its impact on an organization, a number of empirical studies still test, criticize, modify, and extend the model within various areas such as organizations (Seddon 1997; DeLone & McLean 2003), e-commerce (Molla and Licker 2001; DeLone & McLean 2004) and KMS (Maier 2002; Jennex and Olfman 2003, 2004; Qian and Bock 2005). Therefore, with reference to these researches, the present study not only adopted DeLone and McLean’s IS success model (1992) but also modified it for our purpose: knowledge sharing in virtual communities. Hence, constructs included in our research model are Knowledge Quality, Intention to Share Knowledge, and Member Satisfaction.

### 2.3 Self-Efficacy in Virtual Communities

The other construct in the cognitive determinants also important to an individual’s decision is self-efficacy expectation. One’s personal beliefs about his or her capabilities to organize and execute the courses of action required to achieve given goals is called self-efficacy in social cognitive theory (Bandura 1997). Self-efficacy is a form of self-evaluation that influences decisions about what behaviors to undertake, the amount of effort and persistence put forth when faced with obstacles, and the mastery of the behavior. Accordingly, to better understand the role that self-efficacy plays in knowledge sharing behaviors in virtual communities, this study introduces the concept of knowledge sharing self-efficacy (KSSE), which means an individual’s beliefs about his or her capabilities to organize and execute courses of actions required to share given knowledge, as a behavioral control variable to deal with situations in which people face the challenge to attain the goal of exchanging knowledge among individuals in cyberspace.

### 3. Research Model and Hypothesis

Figure 1 shows the proposed research model that is based on IS success model and referred to as an integrated successful model of professional virtual communities. Given that virtual communities (VCs) are cyberspaces supported by computer-based information...
technology, centered upon communication and interaction of participants to generate member-driven contents, and resulting in a relationship being built (Lee et al. 2003), two schools of thoughts including environmental influences (i.e., trust theories), and personal cognitive perspectives (i.e., self-efficacy expectation) thus should be incorporated within IS success model. The following part derives the hypotheses.

3.1 Trust Building Process in Knowledge Sharing

Trust that has different forms in different relationships has a bandwidth that varies in both scope and degree (Paul and McDaniel 2004). Even though they may be separable and vary independently with each other, the different types of trust are related to each other (Mayer et al 1995). One type of trust may evolve into another, deeper type of trust. As Doney and Cannon (1997) pointed out, the process of trust building suggests that a trustor’s willingness to act based on trusting expectations develops through a pattern of cognitive analysis.

First of all, trust primarily involves a calculative process as suggested by staged trust literature in the context of e-commerce or knowledge sharing (Lewicki and Bunker 1996; Panteli and Sockalingam 2005). Meanwhile, when one perceives he/she can gain benefits from the virtual community and is sure to participate in, it represents he/she also believe the community can provide enough protection for his/her privacy in communicating with others since economic benefits include cost and time saving derived from technical efficiencies and security solutions (Ratnasingam 2005). In addition, the existence of enough safeguards to ensure members their personal privacy also represents the virtual community has a good set of management policies or regulations to ensure this assurance. Moreover, when one
believes there exists definite policies and good regulations in the virtual community, it also represents he/she will believe the information provided by other members is followed by the community’s rules and is thus reliable and professional since the incorrect and misleading information will be deleted by the managers. Furthermore, when one is convinced the knowledge provided by other members is always believable and valuable, he/she generates affections for this place and becomes more willing to take care of other members’ questions subconsciously because the next stage of knowledge-based trust is identification-based trust (Panteli and Sockalingam 2005). Finally, affective-based trust has been shown to have a positive impact on the increase overall knowledge exchange, making knowledge exchanges less costly, and increases give and get information (Abrams et al. 2003). As a result, the hypotheses are:

**H1**: Economic-based trust is positively associated with technological-based trust.

**H2**: Technological-based trust is positively associated with managerial-based trust.

**H3**: Managerial-based trust is positively associated with behavior-based trust.

**H4**: Behavior-based trust is positively associated with affective-based trust.

**H5**: Affective-based trust is positively associated with knowledge sharing behavior.

### 3.2 IS Success Model in Knowledge Sharing

The relationship of the constructs that using DeLone and McLean’s IS success model (1992) as theoretical background has been tested and validated in many past researches (please refer to DeLone and McLean 2003). In the context of knowledge sharing, Knowledge Quality has been found to be positively related to User Satisfaction and Intend to Use respectively (Qian and Bock 2005; Jennex and Olfman 2003). Furthermore, User Satisfaction is also found to be positively related to Intend to Use in the context of IS/KMS (Jennex and Olfman 2003; McGill et al. 2003). Similarly within the area of IS/KMS, both Satisfaction and Intention to Use are further found to positively affect on the behavior of the recipients (Qian and Bock 2005; Igbaria and Tan 1997); in other words, they increase online members’ knowledge sharing behavior. Therefore, we hypothesize that:

**H6**: Knowledge quality is positively associated with intention to share knowledge.

**H7**: Knowledge quality is positively associated with members’ satisfaction.

**H8**: Members’ satisfaction is positively associated with intention to share knowledge.

**H9**: Members’ satisfaction is positively associated with knowledge sharing behavior.

**H10**: Members’ intention to share knowledge is positively associated with knowledge sharing behavior.

### 2.3.2 KSSE in Knowledge Sharing

Although there are few studies conducted to empirically examine the casual relationship between self-efficacy and knowledge-sharing behavior, we may still found some significant evidence showing a positive relationship between perceived self-efficacy and levels of cooperation (Rapoport et al. 1989; Van de Kragt et al. 1983) which is the foundation of knowledge sharing since knowledge sharing is a process of social interaction.
Support for this contention can also be found in Cabrera and Cabrera’s (2002) studies that perceived self-efficacy would promote the sharing of knowledge. Thus, knowledge sharing self-efficacy should be a significant precursor of knowledge sharing behavior in virtual communities. Hence, the hypothesis is:

**H11:** Knowledge sharing self-efficacy is positively associated with knowledge sharing behavior.

### 4. Research Method

#### 4.1 Sampling Procedure

The target subjects were individual members of online communities of professional society. The survey questionnaire was posted onto the discussion forum of professional virtual communities from June to August 2004 and all members in each community were cordially invited to support this survey. A cover letter was attached to explain the purpose of this study and to ensure the confidentiality. By the time this survey was closed, 768 questionnaires were collected, of which, 494 were gone through but incomplete, 274 complete questionnaires were analyzed in the present study. The final samples fell into nine types of virtual community: humanities, business, politics, health, entertainment, science, engineering, computers and others.

A pretest of the questionnaire was performed with 5 experts in the IS area. An online pilot study was also conducted involving another 3 professors, 5 Ph D. students and 30 master students who have been members of VCs in various professional areas. The comments collected from these experts led to several minor modifications of the wording and the question item sequence.

#### 4.2 Measurement Development

Items for measuring the five types of trust were adapted from prior related researches and were modified to make them relevant to the context of trust-and-knowledge-sharing—economic-based trust were adopted from Ratnasingam (2005) and Gefen et al. (2003); technological-based trust from Smith (1996) and McKnight (2002); managerial-based trust from McKnight (2002) and Corbitt (2003); and both behavioral-based trust and affective-based trust were adopted from McAllister (1995), Kanawattanachai (2002), and Ridings et al. (2002). For the aforementioned measures, a 7-point Likert type was used, with anchors ranging from strongly disagree (1) to strongly agree (7).

Items for measuring IS success were drawn from prevalidated measure in knowledge management field—Knowledge quality were adopted from Koka and Prescott (2002), member satisfaction were adopted from Oliver (1980), and intention to share knowledge were adopted from Davis, et al. (1989). In addition, Knowledge sharing behavior were adapted from Davenport and Prusak (1998), measuring the frequency of knowledge transmission, i.e. sending or presenting knowledge to a potential recipient. For the
aforementioned measures, a 7-point Likert type was also used, with anchors ranging from strongly disagree (1) to strongly agree (7).

Finally, items for measuring the knowledge sharing self-efficacy were grounded on Nonaka’s (2000) definition as well as Compeau and Higgins’s (1995) prevalidated instrument. Participants were asked to rate their confidence in their ability to perform a behavior under a variety of circumstances with anchors ranging from 0% to 100%.

5. Data Analysis
5.1 Measurement Model

The proposed research model was then evaluated by structure equation modeling (SEM). Therefore, the first step was to assess reliability and validity for the ten measurement scales with LISREL confirmatory factor analysis (CFA).

Table 1. Correlations

<table>
<thead>
<tr>
<th>Construct</th>
<th>CR</th>
<th>ET</th>
<th>TT</th>
<th>MT</th>
<th>BT</th>
<th>AT</th>
<th>KQ</th>
<th>IN</th>
<th>SA</th>
<th>SE</th>
<th>BE</th>
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<tbody>
<tr>
<td>ET</td>
<td>0.85</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>TT</td>
<td>0.90</td>
<td>0.56</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT</td>
<td>0.90</td>
<td>0.62</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>BT</td>
<td>0.86</td>
<td>0.33</td>
<td>0.49</td>
<td>0.75</td>
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<td></td>
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<tr>
<td>AT</td>
<td>0.87</td>
<td>0.22</td>
<td>0.17</td>
<td>0.35</td>
<td>0.66</td>
<td></td>
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<tr>
<td>KQ</td>
<td>0.87</td>
<td>0.73</td>
<td>0.41</td>
<td>0.45</td>
<td>0.24</td>
<td>0.16</td>
<td></td>
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</tr>
<tr>
<td>IN</td>
<td>0.93</td>
<td>0.47</td>
<td>0.26</td>
<td>0.29</td>
<td>0.15</td>
<td>0.26</td>
<td>0.65</td>
<td></td>
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<tr>
<td>SA</td>
<td>0.86</td>
<td>0.68</td>
<td>0.38</td>
<td>0.42</td>
<td>0.22</td>
<td>0.27</td>
<td>0.92</td>
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<td>SE</td>
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<tr>
<td>BE</td>
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</tr>
</tbody>
</table>

Legend: ET= Economic-based Trust; TT= Technological-based Trust; MT= Managerial-based Trust; BT= Behavior-based Trust; AT= Affective-based Trust; KQ= Knowledge Quality; IN= Intention to Share Knowledge; SA= Member’s Satisfaction; SE= Knowledge Sharing Self-Efficacy; BE= Knowledge Sharing Behavior

Diagonal elements are the square root of Average Variance Extracted. These values should exceed the inter-construct correlations for adequate discriminate validity.

Convergent validity of the resulting scales was verified by using three criteria suggested by Fornell and Larcker (1981): (1) all indicator loadings (λ) should be significant and exceed 0.7, (2) construct reliabilities should exceed 0.8, and (3) average variance extracted (AVE) by each construct should exceed the variance due to measurement error for that construct (i.e., AVE should exceed 0.50). For the current CFA model, all λ ranged from 0.73 to 0.94 were higher than 0.70 benchmark. Composite reliabilities of constructs were all greater than 0.85, well above the common acceptance levels of 0.70 (see Table 1). Average Variance Extracted (AVE) ranged from 0.42 to 0.67, all showing reasonable acceptable (see Table 1).

Discriminant validity refers to the principle that measures of different constructs should not be highly correlated. Discriminant validity of the resulting scales was assessed
using the guideline suggested by Fornell & Larcker (1981): the AVE for each construct should exceed the squared correlation between that and any other construct. Table 1 lists the correlation matrix, with correlation among constructs and the square root of AVE on the diagonal. The results indicated that discriminant validity was also acceptable.

5.2 Structural Model

The second step in the data analysis was to examine the overall fit of the path model. For models with good fit (see Figure 2), it is suggested that chi-square normalized by degrees of freedom ($\chi^2/df$) should not exceed 5, Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI) should exceed 0.9 (Bentler 1988). Furthermore, both Goodness-of-Fit Index (GFI) and Adjusted Goodness-of-Fit Index (AGFI) should exceed 0.8 (Etezadi-Amoli and Farhoomand 1996), and root mean square error of approximation (RMSEA) should not exceed 0.05 (Browne & Cudeck 1993). For the current structural model, $\chi^2/df$ was 1.88 ($\chi^2 = 897.45$, df = 477), NNFI was 0.93, CFI was 0.94, GFI was 0.84 and AGFI was 0.81, indicating adequate model fit. While RMSEA was 0.056, slightly higher than the commonly cited threshold, it is still marginally acceptable.

![Path Analysis of Research Model](image)

The strength of individual paths exerted by independent variables was summarized in Figure 2. Nine out of eleven paths were significant. The paths between economic-based and technological-based trust ($\beta = 0.56$, t= 8.37), technological-based and managerial-based trust ($\beta = 1.10$, t= 7.65), managerial-based and behavior-based trust ($\beta = 0.53$, t= 7.81), behavior-based and affective-based trust ($\beta = 0.66$; t= 8.82) were all significant. Hypothesis 1, 2, 3 and 4 were all supported. Furthermore, affective-based trust also exhibited a
significant effect on knowledge sharing behavior ($\beta = 0.17$, $t = 2.79$). Hypothesis 5 was also supported.

However, the path between knowledge quality and intention to share knowledge was insignificant ($\beta = -0.15$, $t = -0.63$). Hypothesis 6 was not supported. Similarly, the path between member satisfaction and knowledge sharing behavior was insignificant ($\beta = -0.08$, $t = -0.83$). Hypothesis 9 was not supported. Nevertheless, knowledge quality has a strong effect on member satisfaction ($\beta = 0.92$, $t = 14.81$). Hypothesis 7 was supported. Member satisfaction also has a significant effect on intention to share knowledge ($\beta = 0.92$, $t = 14.81$). Hypothesis 8 was supported. Finally, the paths between knowledge sharing behavior and intention to share knowledge ($\beta = 0.38$, $t = 4.19$) and between knowledge sharing behavior and knowledge sharing self-efficacy ($\beta = 0.27$, $t = 4.10$) were both significant. Hypothesis 10 and 11 were supported.

6. Discussion and Conclusion

The results of this study are consistent with Social Cognitive Theory indicating that behavior is impacted by both environmental influences and personal cognitive determinants. In the environmental influences, our study showed that five types of trust existed in knowledge sharing and further proved their casual relationship as trust building process, whose sequence are economic-based, technological-based, managerial-based, behavioral-based and then, affective-based trust. In the personal cognitive determinants, our study not only recognized the multi-dimensional nature of IS success but also pointed out the importance of one’s belief about his/her capability in contributing his/her knowledge. Overall, the results indicated that affective-based trust, knowledge sharing self-efficacy, and intention to share knowledge directly affected knowledge sharing behavior.

The findings of this study have several implications. Our study describe the first study in a program of research to examine how the issues of trust and self-efficacy expectation might affect the application of IS success model to knowledge sharing behavior in virtual communities. Studies about IS success model in the context of knowledge management have generally not considered how one’s capabilities influence his/her behavior and thus painted an incomplete picture in establishing knowledge management systems. In addition, in accordance with the recent shift in the knowledge management literature that indicated trust is the central element for knowledge sharing (Davenport and Prusak 1998, p.35; Nelson and Cooprider 1996), our study further introduced the concept of trust building process in influencing knowledge sharing behavior.

However, there are some limitations in our research. First, this study didn’t consider the inter-relationship among these five types of trust. As Doney et al. (1998) indicated that although the cognitive trust-building processes are conceptually mutually exclusive, in practice they may be interrelated. For example, a trustor who engages in frequent
interactions with a trustee helps the trustor assess the trustee’s capability (behavior-based trust) and the trustor is also better able to calculate what benefit he/she can get from the trustee (economic-based trust). Secondly, this study did not classify the members according to the time they participated in. Because self-efficacy beliefs increase over time as more online knowledge sharing practiced, the cross-sectional nature of the study may restrict the impact of self-efficacy on knowledge sharing behavior. Therefore, it would be interesting for future research to conduct this study in a longitudinal method.

Reference


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