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ABSTRACT

This study investigates the underlying motivational factors with regard to the knowledge exchange intentions (intention to obtain and provide knowledge) in virtual community contexts. Perceived virtual network structure, namely, virtual network connectivity and virtual network closeness are suggested as the important antecedents of knowledge sharing intentions in the context of virtual knowledge exchange community. Anonymity, one of the unique characteristics of virtual community but controversial due to its multi-facet effects, is considered in a structural model as a factor having impacts on a virtual network structure.

Keywords

virtual community, knowledge community, network structure.

INTRODUCTION

Knowledge is considered one of the most valuable resources for organizational growth. Organizational knowledge may provide sustained competitive advantage thanks to its unique characteristics such as intangibleness, difficult imitation, and complex organizational embedment (Alavi et al. 2001; Miller et al. 1996; Wasko et al. 2005). Most organizations, however, do not have all knowledge required in their possession within their organizational boundaries and thus need to search for outside source at either organizational or individual level (Anand et al. 2002; Wasko et al. 2005). One way of making such connections to the external source of knowledge at the individual level is by participating in virtual knowledge communities (Wasko et al. 2005). Supported by today's unprecedented growth of electronic communication capability and infrastructure establishment, computer mediated communication (CMC) renders interpersonal networking more attractive and powerful by eliminating geographical and temporal constraints that exist in traditional face-to-face interaction.

Virtual community refers to "groups of people who communicate and interact with each other via electronic media" (Romm et al. 1997) and the notion of knowledge community is described as a group of people with a common interest, problem, experiences and practices. An important feature of knowledge communities is that they bring together knowledge and knower, typically supported and informed by knowledge bases provided over networks (Earl 2001). The combination of these two concepts constitute virtual knowledge community and it has been labeled under different terms in the literature such as virtual communities of practice (VCoP), virtual teams, and electronic networks of practice (ENP) (Alavi et al. 2002; Ardichvili et al. 2002; Chiu et al. 2006; Wasko et al. 2005). Virtual knowledge communities form relational structures or networks that enable efficient knowledge creation and sharing to share or pool knowledge. They exchange and share knowledge interactively, often in non-routine, personal, and unstructured ways, as an interdependent network (Earl 2001). Individuals benefit from virtual knowledge community connections by gaining access to new information, expertise, and ideas that may not be available within an organization (Wasko et al. 2005).

Given the importance of knowledge exchange in virtual communities, this study attempts to develop a model that better explains knowledge exchange in a virtual context. One notable contribution of the current study is to introduce new concepts, *Virtual Network Connectivity* and *Virtual Network Closeness*. This study further examines the model by empirically testing related hypotheses through an online questionnaire survey.

The organization of this paper is as follows. First, hypotheses are developed around the constructs based on the relevant theories. Then, methodology including measurement scale development, data collection and analysis are briefly described. Finally, expected contribution of this study concludes this proposal.

THEORY AND HYPOTHESES

Virtual network connectivity

The network connectivity among members of a virtual community allows a cost-effective way of accessing a wider range of knowledge sources (Chiu et al. 2006). In the literature, it is argued that network ties provide access to resources (Nahapiet et al. 1998). Research has also found that strangers (i.e., weak relational tie) often offer more help than acquaintances, due to their diversity of backgrounds (Whittaker 1996).

Prior research suggests that one way of measuring an individual's embeddedness in a network is to determine the number of social ties the individual has with others in the network (Ahuja et al. 2003). How many such ties an individual has determines his/her centrality in the network that implies the individual's level of accessibility to the resource in the community. In this study, the virtual network connectivity is measured by a perceived degree of virtual connections in terms of how many members an individual interacts with or connects to and how complete the interaction connection is.

Theories of weak ties suggest that the usefulness of help from others may depend on the number of ties, the diversity of ties, or the resources of help providers (Granovetter 1973). Useful weak-tie connection tends to have resources that are superior to those of seekers alone. Statistically, if weak ties are more numerous than strong ties, then calling on weak ties increases the probability that at least one connection will have useful knowledge. (Constant et al. 1996; Friedkin 1982). In this sense, the number and range of ties are important considerations for an individual's intention to obtain knowledge.

Virtual network connectivity may also be associated with the intention to provide knowledge based on the sense of community. Studies found that the more people are in an individual's network connection, the more likely he/she acts collectively to maintain harmony and relationship with other members. Such individuals are more likely than others to understand and comply with group norms and expectations (Marwell et al. 1988; Rogers et al. 1981). The sense of community (also referred to as 'identification' or 'good citizenship') is a condition where the interests of individuals merge with the interests of the community, resulting in the creation of one's identity based on those interests. Therefore, under a strong sense of community condition, the effects of an individual's costs and benefits pertaining to knowledge sharing may not deter knowledge contributions to the community due to his/her dominant concerns for the collective outcome (Constant et al. 1996; Johnson et al. 1999). An individual's sense of community, therefore, conveys a sense of responsibility to help others within the community on the basis of shared membership. Integrating the findings of previous studies and corresponding reasoning addressed above, we advance the following hypotheses:

> **H1a**: *Virtual network connectivity has a positive impact on the intention to obtain knowledge.*

> **H1b**: *Virtual network connectivity has a positive impact on the intention to provide knowledge.*

Virtual network closeness

Previous studies found that frequency of communication across multiple communication modes (face-to-face, phone, and e-mail) was significantly related to the strength of relationship and perceived closeness in the relationship (Cummings et al. 2002). Another study found that time spent in communication is a valid measure of tie strength and perceived intimacy in interpersonal relationships (Marsden et al. 1984).

Virtual network closeness may stimulate the trust aspect of the perceived network structure. Studies suggested that frequent social interactions permit actors to know one another, to share important information, and to create a common point of view (Tsai et al. 1998). As members interact over time, their trusting relationship will become more concrete, and they are more likely to perceive each other as closer and more trustworthy (Granovetter 1985). There are also indications in the literature that virtual trust in this sense is positively related with the intention to get knowledge (Ridings et al. 2002).

It is indicated in the literature that the initial motive of online community participation is to obtain knowledge (Ridings et al. 2002; Wise et al. 2006). Given this initial motive of participants, it is reasonable to predict that they would consider the trust aspect of the potential knowledge providers. Hence, trustworthy relationship through virtual network closeness may command an individual's intention to obtain knowledge in virtual communities.

Perceived closeness and trustworthy relationship also appears to influence knowledge provision intention. Belief in the benevolence of others will influence knowledge exchange due to the reciprocal nature of communication interaction it implies (Ridings et al. 2004). All participants are expected to contribute reciprocal rewards and have desire to do good to others. Participants will be less inclined to provide knowledge in online communities if they feel this adherence to benevolence is lacking (Ridings et al. 2004). Integrating the findings of previous studies and corresponding reasoning addressed above, we advance the following hypotheses:

H2a: *Virtual network closeness has a positive impact on the intention to obtain knowledge.*

H2b: *Virtual network closeness has a positive impact on the intention to provide knowledge.*

Anonymity

One of the unique characteristics of virtual communities is the anonymous nature of interactions. Computer mediated communications (such as the Internet interactions) allows users to hide their true real world identity (in most virtual communities members exchange messages under their screen names or alias rather than their real names; their real world identification profiles are kept confidential for privacy reasons), and many users exploit this feature to escape their real world by interacting online as an alternative virtual ego (Best et al. 2006). In this study, anonymity refers to perceived degree of inability for others to identify the true identity of an individual who posts the message to the community. This anonymity may have benefits in expending individuals' virtual network connectivity by removing social barriers attributed to identification properties such as ethnicity, gender, and age that are readily visible in traditional face-to-face communication interactions (Blanchard et al. 1998; Shah et al. 2001).

In virtual communities, the 'gating features' to the development of any interpersonal relationships are usually absent—easily discernible features such as physical appearance (attractiveness), an apparent stigma such as stuttering (McKenna et al. 1999), visible shyness or social anxiety. Research has long shown that these features have a strong impact not only upon the first impression of the interaction counterpart, but also in determining whether a social relationship will begin between two people (Hartfield et al. 1986). In the virtual community contexts such features are not initially evident and visible due to the anonymous nature of virtual community interactions and thus do not stop potential relationships from getting off ground (McKenna et al. 2002). Anonymity, therefore, may facilitate a condition where individuals establish more social interactions and more relationship connections. Therefore we advance:

H3a: *Anonymity has a positive impact on virtual network connectivity.*

People often engage in greater self-discloser with strangers, because a stranger does not have access to a person's social circle, and thus the dyadic boundary cannot be violated (McKenna et al. 2002). It is commonly argued that anonymity provides a low-threat environment, reduces evaluation apprehension, and breaks down social barriers and conformance pressures. Hence, it disinhibits people's behaviors, promotes more equal participation by group members, and makes people more objective and honest about opinions and ideas (Pinsonneault et al. 1997).

The self-relevant information that one discloses in the course of developing intimacy and closeness in virtual community interactions is not the widely known features of one's public persona or 'actual self,' which is constrained and carefully self-monitored with respect to the social context (Higgins 1987). Rather, it is the identity-important yet usually unexpressed aspects of oneself (also known as 'real me') and the version of self that a person believes he/she actually is, but is unable to reveal or prevented from (for variety of reasons such as social norms) presenting to others in most situations (McKenna et al. 2002). The relative anonymity of Internet interactions greatly reduces the risk of self-discloser, especially about intimate aspects of the self, because one can share one's inner beliefs and honest emotional reactions with much less fear of disapproval and sanction that exist in his/her physical real-world social interaction circumstances (McKenna et al. 1999; McKenna et al. 2002).

Increased self-disclosure due to anonymity may facilitate virtual network closeness. Studies on closeness of relationships have revealed that self-disclosure increases the experience of intimacy and closeness in interactions (Laurenceau et al. 1998). Prior research also found that relationships will develop closeness and intimacy significantly faster over the Internet than traditional face-to-face interaction (McKenna et al. 2002). It is because a virtual community offers the greater ease of self-disclosure and the founding of the relationship on more substantive bases such as honestly shared interests (as opposed to physical attractiveness). Drawing upon the findings of previous studies and corresponding reasoning addressed above, we suggest the following hypothesis:

H3b: *Anonymity has a positive impact on virtual network closeness.*

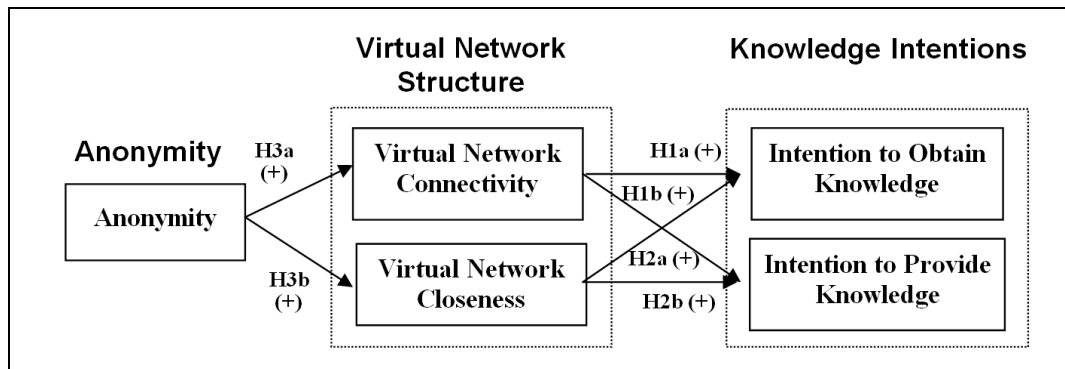Structural depiction of the suggested research model is provided in figure 1.

Figure 1. Research Model.

METHODOLOGY

Scale Development

The survey items were developed from existing literature based on theories and definitions in the previously published related studies. Items adopted from existing literature were modified to fit the context of this study. For the dependent construct, intention to obtain knowledge (OK), three items were adopted from Ridings et al. (Ridings et al. 2002) and three additional items were developed based on the literature. Items for the other dependent construct, intention to provide knowledge (PK) were derived from Ridings et al. (Ridings et al. 2002) and Bock et al. (Bock et al. 2005).

As to the independent variables of this study, measurement items were developed based on the theories and definitions in the literature for virtual network connectivity (CN). It is measured by an individual's perceived degree of virtual connections in terms of how many members he/she interacts with or connects to and how complete the interaction connection is.

For virtual network closeness (CL), four items were adopted from Chiu et al. (Chiu et al. 2006) and two were developed based on the literature to measure virtual network closeness. Eight measurement items were developed for Anonymity (AN), based on the definitions and related questionnaire items used in Pinsonnelault et al. (Pinsonneault et al. 1997).

Through this item development procedure, a total of 34 measurement items were included in the initial pool. As new measurement models have been developed in this study, two rounds of Q-sort exercise were conducted based on these items. Overall hit ratio of the items was 0.89 with each item's hit ratio higher than recommended level: OK (0.96), PK (0.80), CN (0.81), CL (0.83) and AN (1.00). From the result of the Q-sort exercises, 26 final items were selected for the survey.

Analysis and Results

Data collection has been undertaken through online survey from 359 subjects. With the data compiled from the online surveys, structural equation model analysis will be performed. In this study, partial least squares (PLS) structural equation analysis will be employed. PLS is widely used in Information Systems (IS) research reflecting its analytical capability in assessing both measurement and structural models with multi-item constructs (Chin et al. 1995; Sambamurthy et al. 1994).

Measurement Model

PLS analysis involves two stages: (1) assessment of the measurement model, including the reliability and discriminant validity of the measures, and (2) assessment of the structural model. As the first step, a confirmatory factor analysis (CFA) is performed to examine the pattern of loadings of the measurement items. The result shows that all loadings of the 17 measurement items on their anticipated constructs are sufficiently close to the suggested 0.7 (the lowest is 0.694 for the item AN06 on its construct AN: Anonymity), which confirms the reliability of the measurement items in the model (Barclay et al. 1995). The result also reveals that the loadings of all the 17 measurement items are loaded more highly on associated constructs than on other constructs, indicating appropriate discriminant validity of the measurement items in the measurement model (Ko et al. 2005).

Reliability is further assessed by examining Cronbach's alpha coefficients for the items that constitute the constructs of interest. An examination of the measurements in the model yields Cronbach's alpha values between 0.821 and 0.908, demonstrating high reliabilities above the recommended threshold of 0.7 (Nunnally 1978) in PLS analysis, the convergent validity of the constructs is assessed by examining the average variance extracted (AVE). An examination of the measurements in the model indicates AVE values between 0.709 and 0.824, which confirms high convergent validity of all 5 constructs of the model in this study with AVE values well above the recommended threshold of 0.5 (Fornell et al. 1981). In

order to show the discriminant validity of the variables in the model, the square root of AVE for each construct should be greater than its correlations with the constructs (Gefen et al. 2005). As shown in Table 1, all diagonal elements (the square root of AVEs) of the correlation matrix are greater than the off-diagonal elements in the corresponding rows and columns, demonstrating discriminant validity of the measurement model in the study.

	AN	*CL*	*CN*	*OK*	*PK*
AN	**0.842**				
CL	0.118	**0.908**			
CN	0.091	0.663	**0.852**		
OK	0.029	0.112	0.323	**0.848**	
PK	0.044	0.274	0.484	0.687	**0.905**

Diagonal (Bold face): Sq-Rt of AVE

Table 1. LV Correlations.

Structural Model

In PLS analysis the structural model is assessed and hypotheses are tested by examining the path coefficients (which are standardized betas). In addition to the individual path tests, the explained variance (R^2) in the dependent constructs is assessed as an indication of model fit (Compeau et al. 1995).

As shown in Figure 2. the paths from 'virtual network connectivity' (CN) to both of the dependent constructs show significant positive impact (to OK, $\beta = 0.444$, $p < 0.01$, to PK, $\beta = 0.539$, $p < 0.01$) as expected. The paths from 'virtual network closeness' (CL) to both of the dependent constructs show significant *negative* coefficients (to OK, $\beta = -0.182$, $p < 0.05$, to PK, $\beta = -0.083$, $p < 0.10$) while a *positive* sign for each was expected. The explained variances (R^2) of the two dependent constructs, OK and PK, reveal 0.123 and 0.238 respectively. From these results, both hypotheses, H1a and H1b are supported but H2a and H2b are not supported. The results also indicate that 'anonymity' (AN) has a significant positive impact on 'virtual network closeness' (CL) ($\beta = 0.118$, $p < 0.10$) but not on 'virtual network connectivity' (CN). The explained variances (R^2) of the dependent construct, CL is low at 1.4% ($R^2 = 0.014$) providing only a partial support for hypothesis H3b.
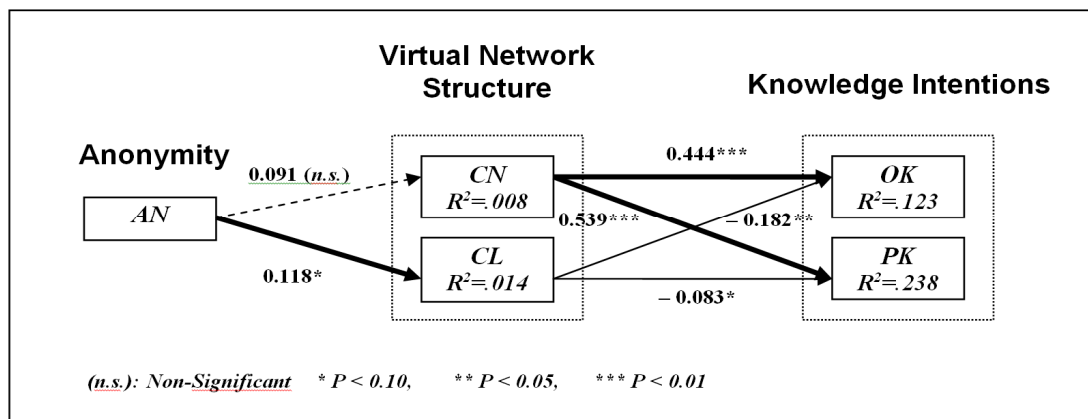

Figure 2. Structural Model–Results.

CONCLUSION

The contribution of this study can be assessed in several points. First, this study examines both intensions in knowledge exchange circumstances, namely, intention to obtain knowledge and intention to provide knowledge in virtual community contexts. Although, there have been studies with similar themes (Chiu et al. 2006; Kankanhalli et al. 2005; Wasko et al. 2005), intention to obtain knowledge has not been considered in those studies and thus, often encountered counter-intuitive

empirical results and discussed this ignorance of intention to obtain knowledge as their limitations. Therefore, investigation of different effects of factors across the two intentions of knowledge exchange would be considered one of the contributions of this study.

Secondly, this study includes a unique aspect of virtual community, 'anonymity' as an independent construct. Since the context of interest is virtual community knowledge exchange circumstance, unique aspects of online communication interactions should be factored in. While employing theories and models from existing literature on organizational face-to-face knowledge exchange situations (Nahapiet et al. 1998; Tsai et al. 1998) into virtual context, related prior studies (Chiu et al. 2006; Kankanhalli et al. 2005; Wasko et al. 2005) are deemed to lack in this virtualization aspect of the model. Although the model in this study focuses on *anonymity's mediation effect* through *Virtual Network Connectivity* and *Virtual Network Closeness* on knowledge intentions, *a direct effect of 'anonymity'* on both of the knowledge intentions (OK and PK) can be an interesting future avenue to explore with related theoretical support.

Finally, this study introduces measurement models, *Virtual Network Connectivity* (CN) and *Virtual Network Closeness* (CL), assessing important characteristics of virtual knowledge networks. Although *Virtual Network Connectivity* showed an opposite direction of impact on knowledge intentions, results reveal that both CN and CL are significant factors to knowledge intentions. This strongly indicates that network connectivity and closeness are important variables not only in face-to-face interactions but also in virtual circumstances as well. We believe that these are important concepts because these properties of virtual networks may generate substantial values to virtual knowledge communities.

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