

Technology**Knowledge Sharing in a Community of Practice**

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The aim of this study is to develop an understanding of the factors influencing participants' knowledge-sharing in an electronic network of practice. The study builds on a theoretical framework derived from the theory of reasoned action and theories of social capital and social exchange. A model of knowledge sharing in an electronic network of practice has been developed based on this framework, which attempts to integrate factors validated through recent empirical studies (Kankanhalli et al., 2005; Wasko and Faraj, 2005; Bock et al., 2005). The model that considers the factors influencing the knowledge contributor and the knowledge seeker has been empirically tested using a survey in the Financial Management Community of Practice (COP) in the USAF Portal.

Figure 1 shows the research model adopted for the study, which incorporates constructs from social exchange theory and social capital theory. Data were collected from members of the Financial Management (FM) Communities of Practice (COP) on the AF portal. Partial least squares (PLS) was chosen as the structural equation analysis method to test the hypotheses.

The study demonstrated that experience in the profession influenced the amount of contribution, but that self-rated expertise did not. The findings indicate that relational capital may not be as important to usage, but it is strongly related to the intention to share knowledge. The study also indicated that commitment to the community of practice was not a factor in knowledge contribution. Concerning anticipated extrinsic benefits, the results show that individuals are not motivated by these types of rewards whether monetary in nature or reputation-based. The hypothesis regarding the sense of self-worth through the intention to share knowledge was not supported. Secondly, the results showed that the anticipated loss of knowledge power that occurs when an individual shares personal knowledge, did not influence an individual's intention to share knowledge in the COP. Finally, an individual's codification effort indicated only a relationship with number of messages posted.

The results provide some evidence that cognitive social capital influences intention to share knowledge.

Introduction

Knowledge is considered a valuable asset for contemporary organizations and the capability for knowledge management has emerged as a critical factor in sustaining competitive advantage (Grant, 1996; Sambamurthy and Subramani, 2005). Brown and Duguid's (2001) research has shown that "the key to competitive advantage is a firm's ability to coordinate autonomous communities of practice internally and leverage the knowledge that flows into these communities from network connections." The flow of knowledge "across individual and organizational boundaries" and into organizational practices is ultimately dependent on individuals' knowledge-sharing behaviors (Bock et. al, 2005). The aim of this study is to contribute to our understanding of the factors that influence individuals' intentions to share knowledge in an electronic network of practice. A model of knowledge sharing in an electronic network of practice has been developed based on recent theoretical and empirical studies. The model that considers the factors influencing the knowledge contributor and the knowledge user has been empirically tested in the Financial Management Community of Practice in the US Air Force Portal.

Information and communication technologies' crucial role in supporting the creation and management of knowledge is well established. The repository model and the network model (Alavi and Leider, 1999) are the two main models of IT-based knowledge management systems. In the repository model an electronic knowledge repository stores codified or explicitly documented knowledge. The network model focuses on the communication and exchange of knowledge among people. A recent trend in the technology for knowledge management is portals—web sites that aggregate various computer-mediated communication tools such as e-mail, forums and chat rooms, coordination tools such as calendars and task lists, and links to data and documents users need. Portals are thus gateways to a knowledge domain that can support both the repository model and the network model of IT-based knowledge management systems. Fernandes *et al.* (2005) suggest that "portal technology provides the best infrastructure to store, access and transfer knowledge."

Typically computer-mediated communication is used by individuals engaged in common practices to form social networks in order to facilitate knowledge exchanges. Brown and Duguid (2001) have identified two forms of such social networks in shared practices based on the notion of communities of practice (Lave, 1991; Lave and Wenger, 1991): communities of practice and networks of practice. Networks of practice are formed by people who share a common practice but do not know each other. In such networks there is typically no collective action and little knowledge is produced (Van Baalen et al., 2005). Wasko and Faraj (2005) use the term "electronic network of practice" to refer to networks of practice where knowledge exchange is achieved primarily through computer-mediated communication. Van Baalen *et al.* (2005) have found that a knowledge portal has an impact on knowledge sharing and on the emergence of a network of practice.

However, as Wasko and Faraj (2005) observe, "the availability of electronic communication technologies is no guarantee that knowledge sharing will actually take place." Sambamurthy and Subramani (2005) point out that IT-mediated knowledge sharing is an intensely social phenomenon, which has not been adequately researched.

This paper continues with an overview of the theoretical framework derived from the theories of social capital and social exchange. It then describes the research model and develops the research hypotheses concerning the relationships assumed in the model. The results of the empirical study conducted to test the model through a survey are presented next. Finally, the conclusions are summarized.

Theoretical Framework

Bock et al. (2005) suggest that individuals' knowledge sharing behaviors are influenced by motivational forces and organizational culture or climate. Findings of research in electronic networks show that enhancing reputation or image, enjoyment in helping others, organizational rewards, reciprocity and knowledge self-efficacy can motivate individuals to share their knowledge (Kankanhalli et al., 2005; Wasko and Faraj, 2000). Prior research also suggests that cost factors such as loss of power and codification effort can act as inhibitors of knowledge contribution (Kankanhalli et al., 2005).

Knowledge sharing can be seen as a form of social exchange where "knowledge contributors share their knowledge with no exact expectation of future return" (Kankanhalli et al., 2005). Prior research has used social exchange theory (Blau, 1964) to identify cost and benefit factors affecting individuals' knowledge contribution. The relationships between some of the cost and benefit factors and sharing behavior are moderated by contextual factors (Kankanhalli et al., 2005). The sum of the aspects of the social structure that moderate and facilitate the actions of individuals within the structure are referred to as social capital (Nahapiet and Ghoshal, 1998). Following Bourdieu (1986), Nahapiet and Ghoshal conceive social capital as the network of relationships embedded within a social structure and "the assets that may be mobilized through that network." They make a distinction between structural, relational and cognitive dimensions of social capital. The structural dimension refers to "the overall pattern of connections between people." The relational dimension "focuses on the particular relationships people have, such as respect and friendship, that influence their behavior." The cognitive dimension "refers to those resources providing shared representations, interpretations, and systems of meaning among parties." Nahapiet and Ghoshal's model is useful in explaining the creation of intellectual capital within organizations. Wasko and Faraj (2005) have adapted Nahapiet and Ghoshal's model to the individual level to examine how aspects of an individual's social capital influence one's knowledge contribution to a network.

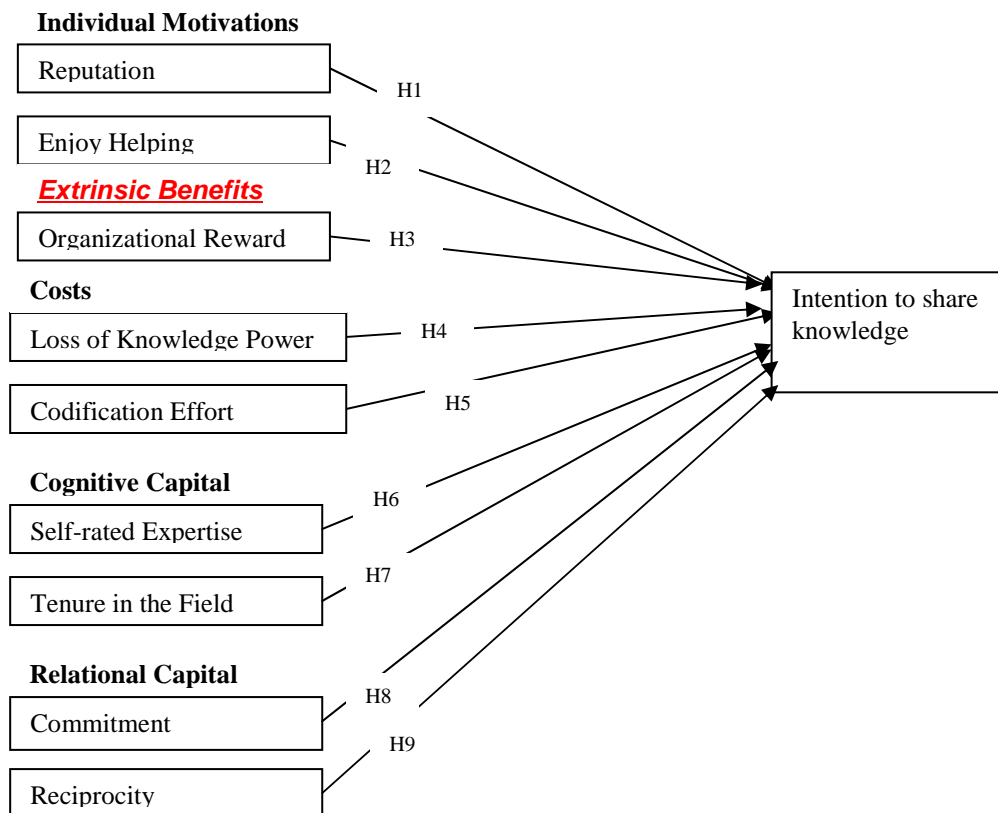
The research model hypothesized in this study attempted to integrate the three models described above to examine how individuals' intention to share knowledge in a network of practice are influenced by the factors derived from social exchange theory and social capital theory.

Bock et al. (2005) have augmented the theory of reasoned action with extrinsic motivators, social-psychological forces and organizational climate factors in their attempt to develop an integrative understanding of the factors influencing individuals' knowledge-sharing intentions. According to the theory of reasoned action (Fishbein and Ajzen, 1975) an individual's engagement in a specific behavior is determined by their intention to perform the behavior, which in turn is determined jointly by their attitude and subjective norm (Bock et al., 2005). The model developed by Bock et al. (2005) posits that an individual's subjective norm influences intention to share knowledge directly and indirectly (through attitude), and organizational climate influences intention to share knowledge directly and indirectly (through subjective norm). They have identified fairness, innovativeness, and affiliation as salient aspects of organizational climate that are conducive to knowledge sharing. They have considered anticipated extrinsic rewards, anticipated reciprocal relationships and sense of self-worth as motivational factors. Their model has more explanatory power with the inclusion of the organizational climate factors that affect attitude toward knowledge sharing through subjective norms and intention to share directly. However, cost factors are not included their in model.

Research Model and Hypotheses

The dependent variable in focus in this study is the degree of intention to share knowledge in an electronic network of practice supported by a portal. In the present paper, we will focus on part of the integrated model that covers only the constructs related to intention to share knowledge. Figure 1 shows the research model, which incorporates the constructs of reputation, enjoyment in helping others, self-rated expertise, tenure in the field, commitment and reciprocity, which have been adopted from Wasko and Faraj (2005). The construct of centrality, which refers to structural links that represent a social tie, has not been considered in our study. Three cost and benefit constructs have been adopted from the Kankanhalli et al. (2005) model: loss of knowledge power, codification effort, and organizational reward. The model thus covers all three of the motivational constructs included in the Bock et al. (2005) model: anticipated extrinsic rewards, anticipated reciprocal relationships, and sense of self-worth (as self-rated expertise).

Figure 1: Research Model (Intention to share knowledge)



Research Methodology

The research hypotheses were tested using data collected through a survey. Table 1 provides formal definitions of the constructs. These constructs were developed and measured using questions adapted from previous studies to enhance validity. The 59 questions in the survey instrument were measured using a five-point Likert scale anchored from “strongly disagree” to “strongly agree”, and a six-point Likert scale to measure self-reported usage anchored from “don’t use at all” to “use several times a day”. All of the questions were subjected to a two-stage conceptual validation based on procedures prescribed by Moore and Benbasat (1991). In the second stage, four financial systems trainers sorted the questions, according to the construct categories provided, with an average hit rate of 91%. Data were

collected from members of the Financial Management Communities of Practice on the AF portal. The Financial Management area consists of six communities of practice: Budget, Cost, Financial Services, Policy, Combat Comptroller, and Unique Organizations. All members use the AF portal on a somewhat frequent basis to share and obtain information and knowledge. The AF portal contains large amounts of financial data and information and is considered by financial professionals in the Air Force as an excellent and reliable source for knowledge. Members actively participate in several different financial communities of practice as it is not uncommon for financial expertise to span several disciplines. Surveys were emailed to all registered users and, out of the 74 surveys sent out, 64 responses were received back (86%). The sample consisted of 4 financial managers, 10 financial analysts, 17 budget analysts, 17 financial specialists, and 15 financial systems trainers.

Table 1: Definition of Constructs

Construct	Definition and Reference
Reputation (REP)	The perception of increase in reputation due to contributing knowledge (Constant et al, 1996)
Enjoy Helping (EH)	The perception of pleasure obtained from helping others through knowledge contributed (Wasko and Faraj, 2000)
Self-rated Expertise (SRE)	The confidence in one's ability to provide knowledge that is valuable to the organization (Constant et al, 1996)
Tenure in Field – months (TIF)	The belief that individuals with longer tenure in the organization are more inclined to share knowledge (Wasko and Faraj, 2005)
Commitment (COM)	The belief in the good intent, competence, and reliability of individuals with respect to contributing and reusing knowledge (Lewicki and Bunker, 1996; Putnam, 1993; Coleman, 1990)
Reciprocity (REC)	The belief that current contribution to would lead to future request for knowledge being met (Davenport and Prusak, 1998)
Loss of Knowledge Power (LKP)	The perception of power and unique value lost due to knowledge contributed (Gray, 2001)
Codification Effort (CE)	The time and effort required to codify and input knowledge (Markus, 2001)
Organizational Reward (OR)	The importance of economic incentives provided for knowledge contribution (Ba et al, 2001)
Intention to Share Knowledge (ITS)	The degree to which one believes that one will engage in a knowledge-sharing act. (Constant et al., 1994; Fishbein and Ajzen, 1981).
Intention to Use Knowledge (ITU)	The degree to which one believes that one will engage in a knowledge-seeking act. (Davis, 1989).
Self-reported Knowledge Usage	The amount of time spent using the knowledge system.

Table 2: Hypotheses

H1:	Individuals who perceive that participation will enhance their reputations in the profession will share more knowledge in the community of practice.
H2:	Individuals who enjoy helping others will share more knowledge in the community of practice.
H3:	Individuals with higher levels of expertise in the shared practice will share more knowledge in the community of practice.
H4:	Individuals with longer tenure in the shared practice will share more knowledge in the community of practice.
H5:	Individuals who are committed to the community of practice will share more knowledge in the community of practice.
H6:	Individuals guided by a norm of reciprocity will share more knowledge in the community of practice.
H7:	Loss of knowledge power is negatively related to the intention to share knowledge.
H8:	Codification effort is negatively related to the intention to share knowledge.
H9:	Organizational reward is positively related to the intention to share knowledge.

Results

Partial least squares (PLS) was chosen as the structural equation analysis technique to test the hypotheses. Following the recommended two-stage analysis procedure adopted by Bock et al. (2005) and Wasko and Faraj (2005), the reliability and validity of the measurement model was first assessed, followed by the assessment of the structural model.

Measurement Model

The convergent validity of the measurement model was assessed by examining the average variance extracted (AVE) and the composite reliability (ICR). AVE scores greater than 0.5 are acceptable and indicate that the construct accounts for the majority of the construct (Wasko and Faraj, 2005). All AVE values were greater than 0.5. ICR values greater than 0.7 are acceptable and all ICR values were greater than this threshold with the exception of reciprocity (0.68). The discriminant validity was assessed by comparing the square root of the AVE with the square of the correlations among the constructs. It was found that each construct had highest correlation values for its own measures indicating that they shared more variance with their own measures than with the other constructs. Factor loadings and cross-loadings generated by PLS also verified adequate discriminant validity.

Structural Model

The proposed hypotheses were tested with PLS Graph 2.91 (Chin and Todd, 1995). To examine the specific hypotheses, t-statistics for the standardized path coefficients and p-values were calculated based on a two-tail test with a significance level of .05. Table 2 presents the results of the PLS analysis used to test the model. Because of the small sample size, it was not possible to test the full model, and analysis was performed in two stages. Stage 1 included the constructs included in the Wasko and Faraj (2005) model. The residual values of the dependent variables were used in stage 2, which included the constructs adopted from the model of Kankanhalli et al. (2005). Table 2 also includes two additional constructs (perceived usefulness and perceived ease of use), which were considered in the study but not covered in this paper.

The R^2 for the stage 1 model was .49 for intention to share. Hypotheses 1 and 2 proposed direct links between perceptions of enhanced reputation and enjoying helping, and the intention to share knowledge. The results indicate no such linkages. Hypotheses 3 and 4 suggested a link between high levels of cognitive capital and the intention to share knowledge. The results indicate that the path between self-rated expertise and the intention to share knowledge was negative and significant ($\beta = -.35, p < .01$). The results indicate that the path between tenure in field and the intention to share knowledge was not significant. Hypotheses 5 and 6 suggested a link between the dimensions of relational capital and intention to share knowledge. The results show a negative and significant link between commitment to the community of practice and the intention to share knowledge ($\beta = -.45, p < .01$). The results indicate no link between reciprocity and intention to share knowledge.

The R^2 for the stage 2 model was 0.01 for the residual intention to share knowledge. Hypotheses 7 and 8 proposed direct links between the dimension of costs and intention to share knowledge. The path between loss of knowledge power and intention to share was negative and significant ($\beta = -.32, p < .01$). There was no link between codification effort and intention to share knowledge. Hypothesis 9 proposed direct links between the dimension of extrinsic benefits and intention to share knowledge. No link was found between organizational reward and intention to share knowledge.

Table 3: Results of PLS Analysis

Stage 1 Results			
	Intention to Share		
	β		
Reputation	.10		
Enjoy Helping	.07		
Self-Rated Expertise	-.35***		
Tenure in Field	.19		
Commitment	-.45***		
Reciprocity	.20		
R-Square	.49		
Stage 2 Results			
	Perceived Usefulness	Perceived Ease of Use	Intention to Share - Residual
	β	β	β
Loss of Knowledge Power			-.32***
Codification Effort			-.04
Organization Reward			.10
Perceived Usefulness			.14
Perceived Amount of Knowledge	-0.25*	-.16	
Perceived Ease of Use	0.43***		
R-Square	.29	.03	.01

p<.10* p<.05** p<.01***

Discussion

The aim of the study was to test a model to investigate what factors influence the individuals' intention to share knowledge in a community of practice. The results provide some support for the theoretical model hypothesized and qualified support for some of the hypotheses. The results suggest that social capital factors (self-rated expertise and commitment) are the most significant predictors of intention to share knowledge. The results are not completely consistent with prior research regarding knowledge sharing. For example, in the Wasko and Faraj (2005) study, reputation and centrality in the community of practice have emerged as significant predictors of individual knowledge contribution. Kankanhalli et al. (2005) have identified enjoyment in helping others as having the strongest impact on knowledge contribution to electronic knowledge repositories. This study has found no significant relationship between individual motivation factors and intention to share knowledge. This may reflect the strong teamwork and collaboration norms in the Financial Management community of practice, which may reduce the significance of enhanced reputation or image as a motivator for knowledge contribution. This result is consistent with the finding of Kankanhalli et al. (2005).

The Wasko and Faraj (2005) study has not considered extrinsic benefits and costs, which are included in the Kankanhalli et al.'s (2005) model. This study has found that organizational rewards may not motivate individuals to contribute their knowledge. This is expected since monetary rewards and compensation are strictly prohibited in government service. Kankanhalli et al. (2005) have found that the relationship between organizational reward and knowledge contribution was both direct and contingent on identification.

However, Bock et al. (2005) have found that anticipated external rewards exert a negative effect on individuals' knowledge sharing attitudes in the context of Korean firms. Eisenberger and Cameron (1996) also argue that task-contingent rewards may in fact negatively impact extrinsic motivations.

Our results indicate that costs due to loss of knowledge power did negatively affect intention to share knowledge. This result is in agreement with the finding of Kankanhalli et al. (2005). It may reflect the natural tendency of individuals to hoard their knowledge (Davenport and Prusak, 1998).

The lack of a significant relationship between codification effort and intention to share knowledge disagree with the finding of Kankanhalli et al. (2005), which has revealed the deterrent effect of codification effort on knowledge contribution under conditions of weak generalized trust. This suggests the possibility that the Financial Management communities of practice may be characterized by strong generalized trust driven by strong teamwork and collaboration norms, which may induce individuals to ignore the effort needed for knowledge contribution.

This study has considered the cognitive and relational dimensions of social capital as moderating the influence of cost and benefit factors on intention to share knowledge. The results show that tenure in the field (in this case the Financial Management community) did not influence intention to share knowledge, but that self-rated expertise did. Wasko and Faraj (2005) have found that tenure in the field positively affected knowledge contribution. This study has found that self-rated expertise had a negative relationship to intention to share knowledge. This suggests that individuals who value their own expertise higher may have tendencies to hoard their knowledge more. The negative relationship between loss of knowledge power and intention to share knowledge further gives support to this interpretation. Wasko and Faraj (2005) have found no link between self-rated expertise and knowledge contribution. They propose further research on the importance of experience and expertise in the practice and their measurement.

In the area of relational capital, the results were split and inconsistent with prior studies. The results indicated a surprising negative relationship between commitment and intention to share knowledge. It needs to be checked that multicollinearity has not caused this relationship. Wasko and Faraj (2005) have also identified a negative relationship between commitment and the helpfulness of contributions and realized that commitment had a suppressor effect. This effect also should be checked for.

The lack of a relationship between reciprocity and intention to share knowledge suggest that individuals may share their knowledge even though they expect that their help will not be reciprocated (Wasko and Faraj, 2005). This runs contrary to previous studies where reciprocity was found to play a significant role in collective action (Putnam, 1995b; Shumaker and Brownell, 1984). As Wasko and Faraj (2005) suggest, in electronic networks of practice reciprocity may be extended to include third parties and expectation of direct reciprocity may not influence knowledge contribution.

Results of this study must be interpreted in the context of its limitations. Given the small sample size and the specialized nature of the Financial Management community of practice, a larger sample size would bring more statistical power to the overall results. A broader sample however, may provide more generalized results and may not be indicative of a tightly interwoven community of practice. Due to the small sample size, a full model with all 12 constructs could not be adequately tested. In order to compensate for this limitation, the results were compared against prior research. By running stage 1 of the model and using the residual values of the dependent variables in stage 2, we were able to test whether the additional variables were able to explain any of the remaining variance in the dependent

variables after controlling for the effects of stage 1. It must also be noted as a potential limitation that one of the ICRs was slightly below the acceptable value of 0.7.

Conclusion

As organizations are increasingly investing more resources in knowledge management initiatives, the particular capabilities they need for creating and sharing knowledge in order to realize competitive advantage are receiving attention. The aim of this study was to develop an understanding of the factors influencing participants' intention to share knowledge in an electronic network of practice. A theoretical framework derived from the theories of social capital and social exchange has contributed to the development of an understanding of some of the factors and has shown the value of these theories for explaining knowledge sharing in electronic networks of practice. A model of intention to share knowledge in an electronic network of practice has been developed based on this framework and empirically tested using a survey in the Financial Management Community of Practice in the USAF Portal.

The study has identified some of the factors that influence and some that do not influence intention to share knowledge in a particular electronic network of practice. The results of the study offer suggestions for leveraging organizational knowledge resources. However, generalization of the results to other contexts requires caution. The findings indicate that reputation, enjoying helping, tenure in the field, reciprocity and organizational rewards do not significantly affect intention to share knowledge. The results also indicate that self-rated expertise, commitment, and loss of knowledge power all negatively influence intention to share knowledge. These results suggest that leveraging organizational knowledge resources should not be viewed as a process that can be quickly achieved through external rewards. Individuals' tendencies to hoard their knowledge may be difficult to overcome and may depend on the organizational culture and climate in complex relationships. Deeper understanding of these relationships is crucial for knowledge management initiatives to achieve the competitive advantage they aspire to.

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