

## An empirical investigation of knowledge creation in electronic networks of practice: social capital and theory of planned behavior (TPB)

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### Abstract

*How to achieve knowledge creation effectively remains a problem, this becomes even more difficult in a loosely knitted community such as networks of practice. This is because knowledge creation entails not only knowledge acquisition but also knowledge conversion. Both of them necessitate complicated social interactions. Since individuals are less likely to share precious insights with strangers, knowledge creation seems infeasible in networks of practice. To address this in a more comprehensive way, this study integrates social capital and TPB (theory of planned behavior) as well as individual motivations. The purpose of this paper is to delineate the relationships among salient antecedents of social capital and TPB, from which the factors that stimulate or impede individuals' knowledge creation can be specified. A survey instrument was used to collect data from a famous network of practice. 202 useful responses were employed to test our model. 11 of the 17 hypotheses are supported by the empirical findings. This paper also provides implications for both academics and practitioners.*

**Key words:** knowledge acquisition, knowledge conversion, networks of practice, TPB

### 1. Introduction

Knowledge represents one of the most valuable resources by which both individuals and organizations leverage and extract value resulting in benefits such as increasing individual's domain expertise, improving work performance, and sustaining competitive advantage (Kulkarni et al. 2007). Knowledge has been defined as information combined with experience, context, interpretation, and reflection (Alavi and Leinder 2001). To make knowledge valuable, the capability of managing and applying knowledge effectively for both individuals and organizations becomes essential. Since managing organizational knowledge effectively rests on individual's competence of transferring and creating knowledge (Bock et al. 2005, Ma and Agarwal 2007), this study focuses on knowledge creation at the

individual level.

To achieve knowledge creation, individuals not only acquire new knowledge, but also transform existing tacit and explicit knowledge into new knowledge (Alavi and Leinder 2001). While tacit knowledge that is rooted in experience, actions, and involvement in a particular context is usually hard to articulate (such as know-how), explicit knowledge is codified and communicated in symbolic form or/and natural language (e.g. users' manual). In addition, as noted by Nonaka (1994), knowledge creation involves social and collaborative processes and individual's cognitive processes, from which knowledge is created, shared, amplified, enlarged, and justified. This may entail knowledge exchange and learning in network connections that are across organizational boundaries (Anand et al. 2002). Given that knowledge creation entails not only individual's knowledge sharing and transforming behavior but also complicated social interactions and activities, how these activities can be achieved efficiently and effectively remains a problem. This problem becomes even more complex in electronic network settings due to the lack of directives or organizational routines (Ma and Agarwal 2007, Wasko and Faraj 2005).

Paradoxically, prior work has identified the capabilities of electronic networks to foster knowledge creation. Ahuja et al. (2003) noted that individuals may use electronic networks to share information quickly, globally, and with people of diverse expertise, such as knowledge sharing and flowing between geographically dispersed coworkers, and distributed research and development efforts (Constant et al. 1996). These networks also support other collaborative activities such as open-source software development, telemedicine, and open congregation on the Internet for individuals interested in a specific practice (Butler 2001).

Despite this, with the exception of Wasko and Faraj (2005), few studies analyzed why and how individuals achieve knowledge sharing in electronic networks of practice, not to mention knowledge creation in the above

setting. To fill this gap, two issues have to be addressed. First, to achieve knowledge creation, individuals should have the ability to acquire knowledge from either acquaintances or unknown others. This may depend on the “kindness (or knowledge contribution) of strangers” (Constant et al. 1996). Grounded on social capital theory, we argue that individuals’ ability to achieve knowledge transfer and sharing may depend on not only individuals’ motivation but also the social capital embedded in the networks. Social capital refers to the resources embedded in a social structure that are accessed and/or mobilized in purposive action (Lin 2001). Second, to analyze knowledge conversion, we believe that the conditions and environments that facilitate socialization, externalization, combination, internalization (SECI) play a critical role (Nonaka 1994, Alavi and Leinder 2001). To address this, we use TPB (theory of planned behavior) to analyze the salient variables (in terms of social capital), from which SECI can be achieved effectively. Therefore, the research questions are: How and why does individual’s knowledge creation behavior be facilitated through electronic networks? We analyze these questions from social capital perspective.

## 2. Research model and hypotheses development

This study uses both social capital and TPB to develop the research model. Regarding the former, four salient antecedents were used—individual motivations, relational capital, structural capital, and cognitive capital. While individual motivations represent the incentive that affects the individual’s participation in social interaction, other three variables refer to those capital embedded in the social network that affects an individual’s social interaction.

### 2.1 Individual motivations

As suggested by both socio-economic and social exchange theories, individuals participate in social interaction only if they perceive that their contributions will be worth doing (such as creating valuable knowledge) with expectations of receiving reciprocity from others (Nahapiet and Ghoshal 1988). Due to these private rewards or social rewards (such as approval and respect), individuals tend to engage in social activities.

Three motivation related factors are proposed in this study. First, self-efficacy refers to the perception of what an individual can do with the capability they possess (Kankanhalli et al. 2005). Knowledge self-efficacy is usually demonstrated in the form of individuals having confidence that their knowledge can help others to solve job-related problems, and achieve knowledge modification and transformation (Constant et al. 1996). This belief serves as a self-motivational force for influencing the attitude towards knowledge creation.

The second factor is reputation. Reputation represents

one of the salient social awards that may affect social interaction (Coleman 1990). As noted by Jones et al. (1997), reputation is a critical asset because it may influence an individual’s status within a group. One of the possible reasons that an individual is willing to engage in a certain activity (such as helping others) of a collective is because doing so may improve his/her personal reputation in the group (Wasko and Faraj 2005). Empirical study confirms this in terms of social exchange theory, establishing reputation serves as a strong motivator for involvement in electronic networks of practice (Kankanhalli et al. 2005, Wasko and Faraj 2005).

Finally, beside the external rewards such as reputation, intrinsic benefits may motivate individual’s knowledge creation. As noted by prior work (Kankanhalli et al. 2005, Wasko and Faraj 2005), altruism represents a type of intrinsic benefits, such as helping others without anticipating the reciprocity. While complete altruism in real world is very few, partial altruism is more common. In other words, self-concern plays a minor role rather than major role in affecting one’s behavior. Empirical study supported this argument (Constant et al. 1996, Wasko and Faraj 2005) by confirming that individuals engage in KM initiatives because of intrinsic motivation. Based on the above arguments, we have the following hypotheses.

***H1a: The greater the knowledge self-efficacy is, the more favorable the attitude toward knowledge creation will be.***

***H1b: The greater the reputation is, the more favorable the attitude toward knowledge creation will be.***

***H1c: The greater the enjoy helping is, the more favorable the attitude toward knowledge creation will be.***

### 2.2 Relational capital

Relational capital stands for the factors that may influence the nature of the relationships within a collective (Nahapiet and Ghoshal 1998). Relational capital encompasses a variety of issues that are involved in a collective, such as strong identification, trust others, an obligation to join in the activities, and perceive and follow institutional norms (Bock et al. 2005, Coleman 1990). Specifically, this study examines two salient factors of relational capital that may exert an influence on either attitude towards knowledge creation or subjective norm (SN) on knowledge creation—commitment and reciprocity. SN refers to “the person’s perception that most people who are important to him think he should or should not perform the behavior in question” (Fishbein and Ajzen 1975).

First, commitment stands for a duty or obligation to join in a specific activity or to pursue a particular aim (Coleman 1990). While direct interaction and expectations within particular personal relationships are

used to generate and convey commitment, it can also be accrued to a collective such as electronic networks. Members of an electronic network of practice who experience a strong sense of commitment to the community have higher tendency to develop favorable attitudes toward knowledge creation than members who possess weaker commitment. This leads to the hypothesis 2a.

Applying SN to our context, SN reflects members' perceptions of whether performing knowledge creation is accepted and encouraged by the networks of practice. In terms of relational capital (Wasko and Faraj 2005), the members who are committed to the network indicate that they tend to recognize and abide by network's norms regarding achieving knowledge creation. Thus, we posit that members characterized by a high sense of commitment to the network are more likely to both value the expectations of other members regarding knowledge creation (i.e. SN) and comply with this SN. This leads to hypothesis 3a.

The second important factor of relational capital is reciprocity, which represents an important aspect of social trust that has not been fully assessed in networks of practice settings (Coleman 1990, Wasko and Faraj 2005). In order to fully realize the influence of reciprocity on knowledge creation behavior in terms of collective efforts, it is necessary to understand trust first. Trust is defined as the anticipation about positive future activities that is derived from a beneficial impression of past interactions. A norm of reciprocity refers a sense of mutual indebtedness; therefore individuals guided by such a norm are likely to reciprocate the benefits they receive from others, ensuring the continuous mutual reciprocity or helpful exchanges (Coleman 1990, Nahapiet and Ghoshal 1998). This phenomenon exists even in a weak tie context such as electronic networks (Kankanhalli et al. 2005). Given that a strong norm of reciprocity exists in a collective, a member trusts that other members will return his knowledge contribution. This in turn stimulates the member to devote her time and energy to contributing knowledge along with creating knowledge. This leads to hypothesis 2b.

Once the members are willing to trust or guided by a norm of reciprocity, this norm becomes the internalized standard against which individuals judge themselves. In other words, the above social norm affects members' behaviors in directions that are consistent with the prevailing group and organizational norms (Huber 2001). Thus, in addition to the direct effect of a norm of a reciprocity on attitude, this study posits that individuals guided by a norm of reciprocity regarding knowledge creation tend to both emphasize the expectations of significant others regarding knowledge creation behavior (i.e. SN) and conform to this SN. This leads to hypothesis 3b.

***H2a: The greater the commitment to the network is, the more favorable the attitude toward knowledge creation will be.***

***H2b: The greater the individuals guided by a norm of reciprocity is, the more favorable the attitude toward knowledge creation will be.***

***H3a: The greater the commitment to the network is, the greater the subjective norm to achieve knowledge creation will be.***

***H3b: The greater the individuals guided by a norm of reciprocity is, the greater the subjective norm to achieve knowledge creation will be.***

### 2.3 Structural capital

Based on theories of collective action and social capital, structural capital refers to the structural links generated by the social connections and interactions between members of a collective. Structural capital serves as a critical predictor of collective action (Coleman 1990, Nahapiet and Ghoshal 1998). When the connection and interaction between members of a collective are strong—structural capital or link is thick, individuals are more likely to involve in collective action. Both intention and behavior of creating knowledge can be explained in terms of structural capital. Since knowledge creation entails both knowledge acquisition and conversion (Alavi and Leidner 2001), individuals interpret, convert, and apply existing knowledge through the interactions of members.

To measure the structural capital in electronic networks of practice, previous study (Ahuja et al. 2003) suggested individual's embeddedness, which represents the number of social ties the individual has with others in the network. Social ties (or structural links) indicate the number of messages that the individual responds to the others' posting. A member's centrality is used to stand for the above ties. Given that strong ties (high centrality) have a positive impact on the cooperation and interaction between members, this in turn implies that strong centrality is more likely to result in both higher intention to create knowledge and more knowledge creation behavior. Therefore, this leads to the following hypotheses.

***H4: The higher an individual's level of network centrality is, the greater the intention to create knowledge will be.***

***H5: The higher an individual's level of network centrality is, the greater the behavior to create knowledge will be.***

### 2.4 Cognitive capital

Cognitive capital represents those resources that facilitate shared understanding and implications. These resources may incorporate a shared language and vocabulary, from which an individual may fulfill a meaningful exchange of knowledge (Nahapiet, and Ghoshal 1998). Language plays a key role in affecting

the effectiveness of the communication between members of a collective, because people use language as a frame of reference for interpreting information in a situated context such as using jargon to share experiences. Individuals establish cognitive capital by performing a variety of activities such as interacting and sharing expertise with others, and learning the skills and norms of practice.

Cognitive capital necessitates the knowledge creation. This is because knowledge creation is infeasible provided that the knowledge contributors do not supply receivers with valuable and useful knowledge. On the other hand, even though the precious knowledge becomes available, knowledge creation is still less likely to achieve if the receivers do not possess the requisite cognitive capital—the capability to perform knowledge conversion and translation. Individuals with higher levels of expertise in the shared practice are likely to both have higher intention to achieve knowledge creation and achieve more knowledge creation than those members with lower expertise. This leads to hypotheses H6a and 7a.

In addition, mastering the application of expertise represents another type of cognitive capital, which involves experience and tenure. Individuals' longer tenure in the shared experience usually implies that they better realize how to apply their expertise and contribute their knowledge to others effectively. Therefore, individuals with longer tenure in the shared practice are more likely to both have intention to creating knowledge and actually perform knowledge creation than those with shorter tenure. This leads to hypotheses H6b and 7b.

***H6a: The higher an individual's level of expertise in the shared practice is, the greater the intention to create knowledge will be.***

***H6b: The longer an individual's tenure in the shared practice, the greater the intention to create knowledge will be.***

***H7a: The higher an individual's level of expertise in the shared practice is, the greater the behavior to create knowledge will be.***

***H7b: The longer an individual's tenure in the shared practice is, the greater the behavior to create knowledge will be.***

## **2.5 TPB and knowledge creation**

As indicated by TRA (Ajzen 1991), an individual's attitude toward a behavior positively affects the intention to participate in that behavior. Here, attitude toward knowledge creating refers to the degree of one's positive perspectives or feelings about performing knowledge creation. This leads to hypothesis 8.

Prior work (Fishbein and Ajzen 1975, Ajzen 1991) argued that the behavior intentions are affected by two

variables—attitudes and SN, although they may be highly correlated. Empirical studies (Bock et al. 2005, Lewis et al. 2003) provided evidence regarding this argument—subjective norms, through social influence processes, exert a positive influence on attitudes. Thus, it is reasonable to assume that the subjective norms of knowledge creation have positive effect on members' attitudes toward knowledge creation. This results in hypothesis 9.

In addition to the impact on attitudes toward knowledge creation, subjective norm, being a perceived social pressure to perform or not perform a behavior, has been supported by quiet a few empirical studies that subjective norm plays an important role in influencing behavioral intention. This leads to hypothesis 10.

As the relation between intention to creating knowledge and the actual behavior toward achieving knowledge creation has been supported by TPB and numerous prior research (Ajzen 1991, Venkatesh et al. 2003), this leads to our final hypothesis (H11).

***H8: The more favorable the attitude toward knowledge creation is, the greater the intention to create knowledge will be.***

***H9: The greater the subjective norm to create knowledge is, the more favorable the attitude toward knowledge creation will be.***

***H10: The greater the subjective norm to create knowledge is, the greater the intention to create knowledge will be.***

***H11: The greater the intention to create knowledge is, the greater the actual behavior toward knowledge creation will be.***

## **3. Research methodology and analysis**

To assess the proposed model, this study used survey method for collecting data. Partial least squares (PLS) method was employed to test our hypotheses. The unit of analysis of this study was the individual.

### **3.1 Measurement and data collection**

In order to have higher validity, this study developed the questionnaire either by adapting the items that had been validated by prior work or by transforming the definitions of constructs into a questionnaire format based on the literature. Specifically, the items for the three salient antecedents regarding individual motivations (knowledge self-efficacy, reputation, and enjoy helping) were adapted from prior research. In addition, we adopted three salient constructs of social capital (relational capital, structural capital, and cognitive capital), which were also proposed by previous research (either theory or empirical research). For example, the centrality is measured as the number of unique individuals a focal individual is connected, regardless of the total number of messages posted. The

items measuring TPB-related constructs such as attitude, subjective norm, and behavioral intention were adapted from Ajzen's (1991) study. Finally, based on Bailey and Pearson's (1983) procedure, we normalized the scores of subjective norm to reduce any possible scaling issues. In terms of the dependent variable—knowledge creating behavior, the items for assessing it were also adapted from previous studies (Ajzen's 1991, Lee and Choi 2003) regarding knowledge creation and SECI.

The initial version of the questionnaire was modified according to the responses of a pretest with 53 respondents from 11 organizations in 5 industries in Taiwan. After that, this study assessed both the internal consistency and discriminant validity of the instrument. All of the Cronbach's alpha values were acceptable—ranging from 0.71 to 0.94. Totally 11 items were deleted from the original questionnaire due to the low factor loading (less than 0.6). These items belong to five different constructs respectively, including knowledge self-efficacy, reputation, enjoy helping others, attitude toward knowledge creation, and actual behavior of knowledge creation.

This study then used the refined questionnaire to collect data. Data were collected from members of a legal professional association (digital network society (DNS)) in Taiwan. DNS falls into the category of electronic networks of practices due to the following two characteristics. First, DNS facilitates information exchange and discussion among its members through computer-based communication technology such as message boards that is supported by a Web-based system similar to a bulletin board. Second, as part of members' benefit, knowledge exchanges in the message boards is open to individuals interested in a specific subject. The above knowledge transfer and acquisition are visible to members and messages related to a specific subject are categorized as a discussion thread.

In order to collect responses from the members of DNS, 616 self-administrated questionnaires refined from the pretest were sent, with 248 responses returned (40 response rate). Out of these responses, 46 responses with incomplete data were eliminated from further analysis. Consequently, 202 responses from more than 7 industries were used in the data analysis.

### 3.2 Analysis methods

This paper adopted PLS (partial least square) (Chin 2003) to test the hypotheses. PLS is a structural equation modeling technique that not only evaluates both the reliability and validity of the constructs, but also assesses the relationships among these constructs of a proposed research model. As suggested by prior research (Chin 2003), two-stage analytical approaches were used—confirmatory factor analysis was first performed to examine the measurement model, while the structural relationships were validated next.

To evaluate our measurement model, three types of validity were tested—content validity, convergent validity, and discriminant validity. Content validity refers to the consistency between the measurement items and the existing literature. This was achieved by both interviewing senior practitioners and pilot-testing the instrument. To ensure convergent validity, this study evaluated composite reliability and average variance extracted (AVE) from the measures (Chin 2003, Heir et al. 1998). As suggested by Chin (2003), 0.7 is a generally accepted threshold value for measuring reliability. As Table 1 indicated, the values of composite reliability are all above 0.911. Concerning the measure of AVE (average variance extracted), 0.5 is a recommended value (Fornell and Larcker 1981). Table 1 lists the measure of AVE that ranges from 0.54 to 1.00, which is above the acceptable values. Further, the weights and loadings of the constructs in this research model are all acceptable. Finally, as indicated in Table 2, the discriminant validity of our instrument was verified by evaluating the square root of AVE—the square root of the AVE for each construct is greater than the levels of correlations involving the construct (Fornell and Larcker 1981). At the same time, the results of the inter-construct correlations also confirm that each construct shares larger variance with its own measures than with other constructs. To further analyze the discriminant validity, this study assessed both loadings and cross-loadings, these results are all acceptable.

### 3.3 Test of our research model

Since the assessing of our research model shows acceptable validity and reliability, the proposed hypotheses as well as the fit of our model were examined by PLS. Figure 1 lists the model generated by PLS analysis and the tests of hypotheses are summarized in Table 3 (the first column of the results). The results are explained in the following sequence: antecedents (in terms of social capital) of TPB constructs (H1 to H7) and standard TPB constructs (H8 to H11).

The findings regarding the antecedents of social capital to the standard TPB constructs are mixed. Seven of the thirteen hypotheses are supported. Hypotheses 1c, 2b, 3a, 3b, 6a, 7a, and 7b represented those relationships that are supported by our empirical findings. As expected, H1c and H2b indicate that both individual motivations and relational capital play a critical role in affecting the attitude toward knowledge creation—specifically the favorable attitudes toward knowledge creation are affected not only by individuals who enjoy helping others, but also by those individuals who are guided by a norm of reciprocity. Next, positive subjective norm is influenced by relational capital as expected (H3a, 3b)—both individual's commitment and norm of reciprocity. Surprisingly, the impact of cognitive capital on intention to perform knowledge creation is mixed (H6a, 6b)—the intention is affected by individuals' expertise rather than by their tenure. However, as

expected (H7a, 7b), both of the above issues exert a positive effect on KC behavior. Other findings that contradict our hypotheses are H4 and 5. Due to the significant negative coefficient between centrality and KC behavior, we suggest that instead of fostering the behavior of creating knowledge, network centrality impedes it. Another interesting finding is the mediated effect of subjective norm between attitude toward

knowledge creation and commitment, because hypothesis 2a is not significant whereas both hypothesis 3a and hypothesis 9 are positively significant. In other words, commitment affects attitudes toward KC indirectly through subjective norm rather than directly; this finding implies that even in the network of practice settings, collectivist orientation still exerts a strong influence on individual's attitude toward KC.

Table 1. Results of confirmatory factor analysis

Construct	ITEM	Composite Reliability	AVE
Knowledge self-efficacy (KSE)	1	1.000000	1.00
Reputation (REPU)	2	0.943728	0.893642
Enjoy helping (HELP)	3	0.923312	0.801005
Commitment (COM)	3	0.911653	0.775072
Reciprocity (REC)	2	0.932509	0.873553
Centrality (CEN)	1	1.000000	1.00
Self-rated expertise (EXP)	1	1.000000	1.00
Tenure in the field (TEN)	1	1.000000	1.00
Attitude toward knowledge creation (ATT)	4	0.951807	0.831671
Subjective norm (SN)	6	0.929147	0.687074
Intention to create knowledge (INT)	5	0.922514	0.704595
Knowledge creation behavior (KC)	13	0.938415	0.540592

Table 2. Correlation between constructs

	KSE	REPU	HELP	COM	REC	CEN	EXP	TEN	ATT	SN	INT	KC
KSE	1.000											
REPU	0.134	0.945										
HELP	0.368	0.146	0.895									
COM	0.235	0.156	0.591	0.880								
REC	0.179	0.143	0.453	0.626	0.935							
CEN	0.063	-0.038	0.144	0.191	0.105	1.000						
EXP	0.038	-0.042	0.119	0.207	0.093	0.809	1.000					
TEN	0.056	-0.072	0.082	0.251	0.019	0.779	0.779	1.000				
ATT	0.175	0.132	0.444	0.434	0.485	0.097	0.058	0.115	0.912			
SN	0.157	0.235	0.424	0.581	0.473	0.064	0.030	0.131	0.369	0.829		
INT	0.283	0.101	0.387	0.377	0.276	0.023	0.031	0.019	0.383	0.210	0.839	
KC	0.312	0.172	0.505	0.617	0.505	-0.041	0.043	0.046	0.316	0.465	0.553	0.735

Note:  
 KSE: knowledge self-efficacy; REPU: reputation; HELP: enjoy helping  
 COM: commitment; REC: reciprocity  
 CEN: centrality; EXP: expertise; TEN: tenure  
 ATT: attitude of knowledge creation; SN: subjective norm; INT: intention to create knowledge; KC: knowledge creation.  
 The shaded numbers in the diagonal row are square roots of the average variance extracted (AVE)

Table 3. Summary of hypothesis testing

Hypothesis		Result		
		Original Model	Model 1( high relational capital)	Model 2 (low relational capital)
<b>Individual motivations → attitude toward KC</b>				
H1a	Knowledge self-efficacy→ attitude toward KC	No	Yes	Yes
H1b	reputation→ attitude toward KC	No	No	Yes
H1c	enjoy helping→ attitude toward KC	Yes	Yes	Yes
<b>Relational capital→ attitude toward KC</b>				
H2a	Commitment→ attitude toward KC	No	No	No
H2b	Norm of reciprocity→ attitude toward KC	Yes	No	Yes
<b>Relational capital→subjective norm</b>				
H3a	Commitment→subjective norm	Yes	Yes	Yes
H3b	Norm of reciprocity →subjective norm	Yes	Yes	Yes
<b>Structural capital →intention to perform KC and KC behavior</b>				
H4	Network centrality → intention to perform KC	No	No	Yes
H5	Network centrality→KC behavior	No	No	Yes
<b>Cognitive capital→ intention to perform KC</b>				
H6a	Expertise→ intention to perform KC	Yes	No	No
H6b	Tenure→ intention to perform KC	No	No	No
<b>Cognitive capital→KC behavior</b>				
H7a	Expertise →KC behavior	Yes	Yes	No
H7b	Tenure →KC behavior	Yes	No	No
<b>Standard TPB constructs</b>				
H8	attitude toward KC→ intention to perform KC	Yes	Yes	Yes
H9	subjective norm→ attitude toward KC	Yes	Yes	No
H10	subjective norm → intention to perform KC	Yes	Yes	No
H11	intention to perform KC →KC behavior	Yes	Yes	Yes

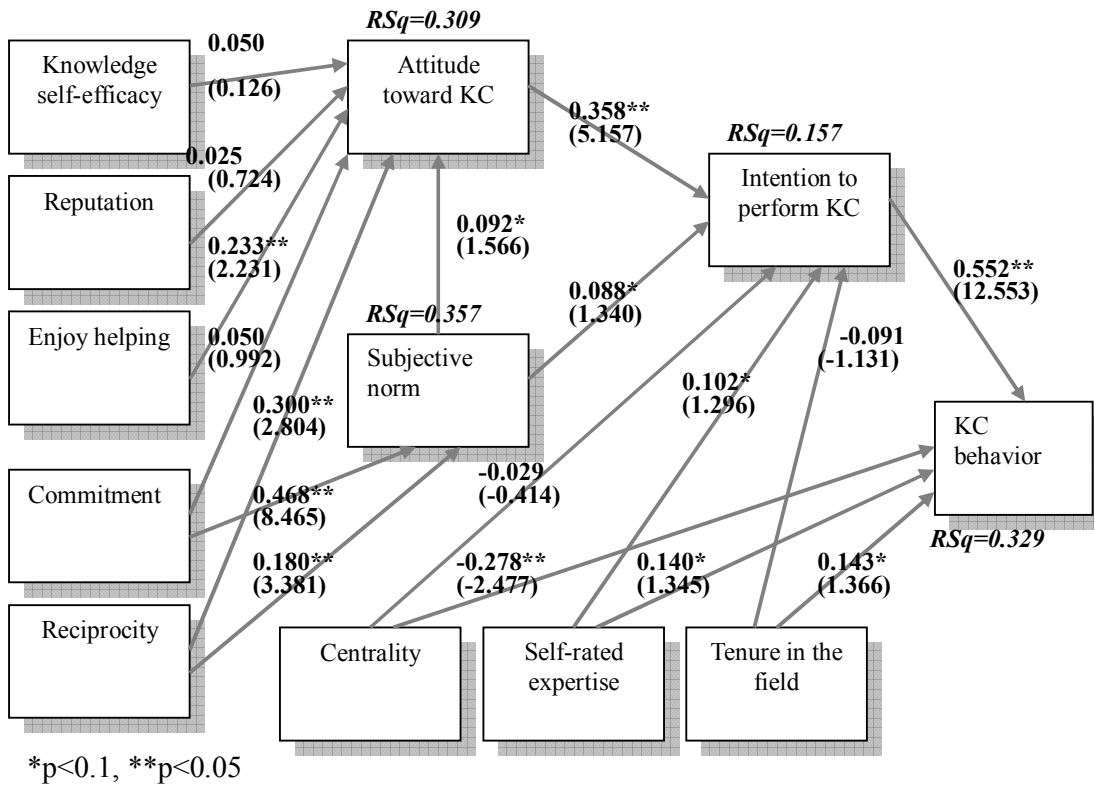
Finally, consistent with the TPB theory that has been used by many previous studies (e.g. Bock et al. 2005) to explain individual’s behavior, hypotheses 8 to 11 are supported. The findings regarding subjective norm (i.e. H9 and 10) confirm that it affects intention both directly and indirectly (through attitudes). This further indicates that even in a weak-tie (open and voluntary) community, strong collective orientation still plays a key role in affecting members’ attitude and intention.

Besides, since the relational capital plays a significant role in affecting both attitude toward KC and subjective norm on KC, we conducted post-hoc analysis after dividing the sample into two groups by K-mean clustering algorithm—the high relational capital group vs.

the low relational capital group. The second and third column of the result part in Table 3 list the findings related to these two groups respectively. From these results, while the effect of norm of reciprocity positively influences attitude toward KC when members possess low level of relational capital ( $\beta = 0.499, p \leq 0.05$ ), the relationship between norms of reciprocity and attitude toward KC is insignificant for the group of members with high relational capital. In addition to the above findings, SN also exerts positive influence significantly on attitude on KC under high norm of reciprocity condition ( $\beta = 0.193, p \leq 0.05$ ), whereas the above relationship is insignificant when the norm of reciprocity is low. In sum, the above findings indicate that norm of

reciprocity plays a moderating role in affecting knowledge creation attitude. Further, when the members have a high level of norm of reciprocity, the SN rather than the norm of reciprocity exerts a positive effect on

attitude toward KC. This implies that the role of relational capital (especially norm of reciprocity) in affecting the SN of a collective, which in turn influences an individual's attitude toward KC.



KC denotes knowledge creation

Figure 1. Results of PLS analysis

### 3.3 Addressing common method variance

Common method variance (CMV) refers to a potential threat to internal validity, especially to research using surveys that collect responses in a single setting. To deal with CMV, we used the following approaches. First, we collected data in two separate stages—with dependent and independent variables measurement separated in time. Second, we used factor analysis to examine the CMV in the data set. According to Harman's one-factor test, CMV is high provided that a single factor accounts for a majority of covariance in the independent and dependent variables. Our factor analysis did not detect such a single factor explaining a majority of the covariance. Using the above methods, we believe that CMV is unlikely to occur in this study.

### 4. Discussion and implications

The purpose of this paper has been to explore the factors in terms of social capital that tend to affect an individual's knowledge creation intention and behavior.

This study addresses the above problems particularly under networks of practice setting, because knowledge creation entails both knowledge contribution and conversion, which are less likely to happen under an environment that lacks strong interpersonal ties and norms of direct reciprocity such as networks of practice. However, the behavior and intention of knowledge contribution and conversion in networks of practice can be explained in the light of social capital theory. Specifically, we identified a number of possible antecedents that may have impact on either knowledge creation behavior or intention, such as motivation (computer self-efficacy, reputation, and enjoy helping), relational capital (commitment and reciprocity), structural capital (centrality), and cognitive capital (self-rated expertise and tenure). To delineate the relation between the above social capital and knowledge creation behavior, we drew on the modified TPB. 11 of the 17 hypotheses were supported by our empirical findings (a survey of a network of practice in Taiwan). In addition, the moderating effect of norm of reciprocity on attitude toward knowledge creation was specified. Each of the



above findings represents a significant contribution to our comprehensive understanding of why members of a network of practice are involved in knowledge creation. Particularly, this study identifies the following insights.

First, the findings regarding the impact of individual motivations on attitude toward KC are inconsistent with the theory—both individuals' knowledge self-efficacy and reputation do not affect attitude toward KC significantly, while intrinsic benefits such as enjoy helping motivate individuals' KC. Further, as shown in Table 3, the above results are moderated by relational capital. While all of the factors of individual motivations influence attitude toward KC positively under a low relational capital situation, the above results are mixed when relational capital is high—the reputation does not affect attitude toward KC significantly.

Second, the findings concerning the influence of relational capital are mixed. While both commitment and norm of reciprocity affect SN significantly as expected, surprisingly the impact of commitment on attitude of KC is insignificant. In addition, norm of reciprocity exerts the strongest influence on KC attitude compared to the rest of factors (such as individual motivations and commitment) that affect attitude of KC. Further, relational capital plays a moderating role in KC attitude.

Third, surprisingly centrality impedes (rather than facilitate) both knowledge creation intention and behavior, whereas this impact is contingent on relational capital. In other words, while individuals' centrality exerts a negative influence on both KC intention ( $\beta = -0.256$ ,  $p \leq 0.05$ ) and behavior ( $\beta = -0.201$ ,  $p \leq 0.05$ ) significantly when individuals' relational capital is high, individuals' centrality has a positive impact on both KC intention ( $\beta = 0.624$ ,  $p \leq 0.05$ ) and behavior ( $\beta = 0.597$ ,  $p \leq 0.05$ ) when the level of relational capital is low.

Finally, as expected, cognitive capital (both expertise and tenure) affects KC behavior positively (although the significance of  $p$  is at 0.1 level only—i.e.  $p \leq 0.1$ ). However, while expertise exerts a positive influence on KC intention, the impact of tenure on the intention to perform KC is insignificant. Further, the expertise has positive influence on KC behavior significantly ( $\beta = 0.209$ ,  $p \leq 0.05$ ) when members possess strong relational capital, whereas expertise exerts a negative effect on KC behavior ( $\beta = -0.389$ ,  $p \leq 0.05$ ) when the individuals have weaker relational capital.

#### 4.1 Implications to academics

In addition to the above contributions to our understanding of the role of the salient social capital that either fosters or hinders individuals' knowledge creation behavior, this study contributes in two perspectives to the TPB-related research. First, this study confirms the role of subjective norm in affecting intention to perform KC both directly and indirectly through attitude. Such

relations hold even for the loosely knitted setting such as the networks of practice that we surveyed. Second, our results suggest that cognitive capital (both expertise and tenure of individuals) affects KC behavior directly. This is very similar to the facilitating conditions in Venkatesh et al's (2003) UTUT model or the original PBC construct belonging to TPB model (Ajzen 1991).

#### 4.2 Implications to practitioners

Our findings provide several useful suggestions for those companies that want to achieve KC effectively. First, how a firm can manage to facilitate the influence of social capital on knowledge creation effectively becomes an important issue to be addressed. Second, a firm should nurture a community—as our data suggested, KC is feasible even in a loosely knitted community, before launching any KC initiatives. Based on our findings and a broad set of research applying TPB, establishing subjective norms play a key role in affecting KC behavior. KC subjective norms are in turn affected by both individuals' commitment to the network and the individuals guided by norms of reciprocity (i.e. relational capital).

#### 4.3 Limitations and future research

This study should be interpreted in terms of its limitations. First, since this is a cross-sectional research without longitudinal measurement, in spite of the research model that is grounded on generally accepted and firm theories, the results could only be inferred rather than proven. Second, since this study focused on a single network of practice only, the interpretations are limited to this community only. To generalize our model to a broader scope, it is necessary to examine the role of culture. This is because a community may possess a specific culture that fosters individuals' behavior—such as a culture of collective action that affects individuals' knowledge creation behavior (Bock et al. 2005). Future study may focus on comparing the KC behavior between different types of networks of practice, or between communities with different cultures (Lee 1990, Leidner and Kayworth 2006).

### 5. Conclusions

One of the effective methods to facilitate knowledge creating rests on a well-established network of practice. Especially, a community possesses a highly collectivist sense regarding knowledge sharing and conversion. As long as the community has both strong relational capital (such as members have strong commitment to the community and are guided by a norm of reciprocity) and subjective norms, members are likely to perform KC even though this community is weakly knitted. In addition, since both individuals' cognitive capital (expertise and tenure) and intention to achieve KC play an important role in facilitating KC behavior, it is very helpful to achieve knowledge sharing and conversion provided that individuals engage in a prestigious and

popular community. By integrating social capital and TPB theories as well as motivational drivers in a network of practice setting, the empirical findings of this study contribute to the comprehensive understanding regarding the contexts (either within or across organizational communities) that foster KC.

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