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Knowledge Sharing Behavior in E-Communities: from the Perspective of Transaction Cost Theory

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***Abstract*—**This study aims to examine the factors affecting knowledge sharing behavior in knowledge-based electronic communities (e-communities) because quantity and quality of knowledge shared among the members play a critical role in the community's sustainability. Past research has suggested three perspectives that may affect the quantity and quality of knowledge shared: economics, social psychology, and social ecology. In this study, we strongly believe that an economic perspective may be suitable to validate factors influencing newly registered members' knowledge contribution at the beginning of relationship development. Accordingly, this study proposes a model to validate the factors influencing members' knowledge sharing based on Transaction Cost Theory. By doing so, we may empirically test our hypotheses in various types of e-communities to determine the generalizability of our research models.

***Keywords*—**Electronic community, individual behavior, knowledge sharing, transaction cost theory.

I. Introduction

THE proliferation of network access has facilitated the rapid growth of electronic communities (e-communities). An e-community is a cyberspace supported by information technology. It is centered upon the communications and interactions of participants to generate specific domain knowledge that enables participants to perform common functions and to learn from, contribute to, and collectively build upon that knowledge [4]. The impact of e-communities on daily activities is increasingly pervasive, ranging from economic and marketing to social and educational. Many individuals participate in communities to seek knowledge or to solve problems at work [3]. Many organizations have also recognized the e-community as a valuable system that holds the key to knowledge management and thus they have begun to support the development and growth of e-communities to meet their business objectives [15].

Knowledge sharing occurs when an individual disseminates his created or acquired knowledge to other members within an organization [27]. The biggest challenge in fostering an e-community is the supply of knowledge, namely the willingness of a member to share knowledge with other members. It is then important to explain why individuals elect to share or not to share knowledge with other community members when they have a choice [3, 17] [3]. Therefore, identifying the motivations underlying knowledge sharing behavior in e-communities would help both academics and practitioners gain insight into how to stimulate knowledge sharing in e-communities.

Prior studies have emphasized the importance of knowledge sharing in organizations. However, there are few empirical studies on the link between knowledge sharing and an economic perspective. While Transaction Cost Theory (TCT) and Agency Theory are commonly adopted in knowledge sharing research, most are conceptual frameworks or take a qualitative approach. From an economic perspective, it provides a way to investigate how to minimize barriers and cultivate enablers in order to reap the benefits of knowledge sharing in an organization.

Most previous studies on TCT perform only partial empirical examinations; for instance, transaction cost is not directly assessed when empirical researchers intend to explain these costs [29]. Because transaction cost is difficult to measure, previous studies only examine the relationship between the constructs of TCT and organizations. The constructs of TCT includes assets, uncertainty, frequency, and so forth [19, 20, 23, 24]. Hence, the objective of this study focuses on the TCT to better understand quantitatively and qualitatively why people contribute knowledge in e-communities.

II. Theoretical Development

A Knowledge Sharing

Knowledge sharing occurs when an individual disseminates his or her acquired knowledge to other members within an organization [27]. In this sense, knowledge is viewed as an object [11] that can be transferred from the minds of people who possess it to the minds of those who seek it. Hence, knowledge sharing concerns the individuals' willingness to share their knowledge they have created and acquired [7, 12]. Understanding factors affecting knowledge sharing is an important issue for academics and practitioners in the IS field.

Studies adopting an economic perspective [1, 5, 7, 14, 16, 17, 26] emphasize the importance of motivators such as monetary incentive, promotion, and educational opportunity in shaping knowledge-sharing behavior [7]. In this sense, the individual is treated as a rational and self-interested party [5, 7, 13] who may behave in ways to maximize his or her utility [7, 18] and minimize costs [1, 15].

In this study we believe that e-communities offer cyberspaces to allow members with common interests and practices to discuss and learn from the community's explicit

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knowledge and to share their tacit knowledge via information technology.

B. Transaction Cost Theory (TCT)

The Transaction Cost Theory was proposed by Coase [25] and then elaborated by Williamson [19, 20, 23]; it addresses economics, law, and organizational issues. The unit of analysis in TCT is a transaction [19]. Based on classical economics, in a perfectly efficient market, resources are best allocated by the price mechanism. However, Transaction Cost Theory differs from this. Coase [25] argues that market prices govern the relationships between firms but within the firm decisions are made on a basis different from maximizing market prices. In other words, firms maximize profit, and maximizing profit involves minimizing cost. Transactions costs arise for ex ante reasons (i.e. search cost, negotiation cost) and ex post reasons (i.e. monitoring cost, maladaption cost). Williamson [22] argues that firms want to minimize their total costs, which are made up of both production and transaction costs. Under some circumstances transaction costs may be lower if the transaction takes place in an open market; in other situations costs will be lower if managers coordinate the transaction.

The real explanatory power of the theory, though, comes from the two dimensions or variables that are used to characterize any transaction as follows:

1) Asset specificity, which states that the value of an asset may be attached to a particular transaction that it supports. Asset specificity can be divided into two types: site asset specificity and human asset specificity [28]. Site asset specificity refers to the successive stages that are immobile and are located in close proximity to one another so as to economize on inventory and transportation expenses. In other words, e-community managers who invest in and manage assets (i.e. hardware/software) will impact senders' and receivers' knowledge sharing behavior in an e-community. Human asset specificity arises in a learning-by-doing fashion through long-standing customer-specific operations. Human asset specificity in an e-community would thus be the value emerging from learning a system by using it repeatedly. It can also be related to the value of interpersonal relationships with members of the e-community. From these concepts we develop the following hypotheses:

***Hypothesis* 1a:** Site asset specificity positively influences the quantity of knowledge sharing in an e-community.
***Hypothesis* 1b:** Site asset specificity positively influences the quality of knowledge sharing in an e-community.
***Hypothesis* 2a:** Human asset specificity positively influences the quantity of knowledge sharing in an e-community.
***Hypothesis* 2b:** Human asset specificity positively influences the quality of knowledge sharing in an e-community.

2) Uncertainty, which is the second principal factor that we draw from TCT [20]. It arises from the difficulty in predicting the actions of the other party in the transaction, due to opportunism and bounded rationality. TCT indicates that an appropriate response to too much uncertainty in the transaction is to abort the transaction [20, 25].

Drawing from several theoretical streams, our research has identified two types of uncertainties: behavioral uncertainty and environmental uncertainty. Behavioral uncertainty is defined as ''the inability to predict partner's behavior or changes in the external environment'' [2]. It arises from the difficulties associated with monitoring the performance of transaction partners [19]. From this we develop the following hypotheses:

***Hypothesis* 3a:** Behavioral uncertainty negatively influences the quantity of knowledge sharing in an e-community.
***Hypothesis* 3b:** Behavioral uncertainty negatively influences the quality of knowledge sharing in an e-community.
***Hypothesis* 4a:** Environmental uncertainty negatively influences the quantity of knowledge sharing in an e-community.
***Hypothesis* 4b:** Environmental uncertainty negatively influences the quality of knowledge sharing in an e-community.

Fig. 1 illustrates the conceptual framework of this study.

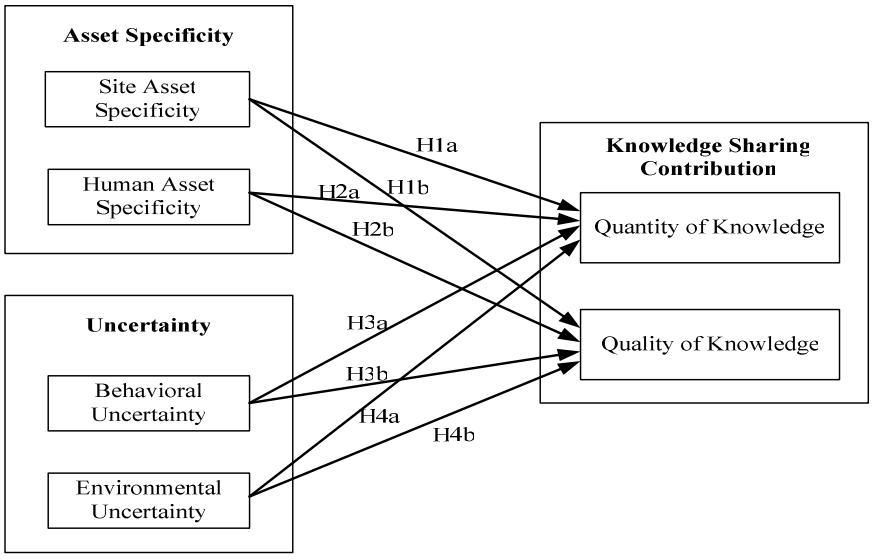

Fig. 1 Conceptual Framework

III. Research Methodology

The primary objective of empirical research is to examine the relationship between independent and dependent variables. In this study, we adopt the survey method.

A. Subjects and Procedures

Subjects in this study are 153 students, who had knowledge sharing experience in e-communities. The survey took place during a 3-month period from 2007 winter to 2008 spring. The foreword of the questionnaire explains the purpose of this study so to ensure confidentiality. As a result, 164 responses are collected. The exclusion of 11 invalid responses results in a total of 153 complete and valid ones for data analysis. Most of the subjects are full-time students at undergraduate level; some are executives or managers working full time and enrolled in graduate programs for MBA degree or doctoral degree. Half of the subjects are over 20 years of age, half of the subjects have more than 3 years of participation in e-communities experience; 50.3 percent are men, 49.7 percent women. Table I lists the demographic information of the subjects.

TABLE I
Demographics

Measure	Items
Gender	Male: 50.3%
	Female: 49.7%
Age	<18 years: 0.7%
	19-25 years: 63.4%
	26-30 years: 13.1%
	31-40 years: 17.0%
	41-50 years: 5.2%
	Over 51 years: 0.7%
Education	College: 20.9%
	University: 55.6%
	Graduate-level or above: 23.5%
Job	Manufacture: 9.2%
	Service: 3.9%
	Financial: 1.3%
	Information/Engineer: 4.6%
	Government/Educational: 7.2%
	Student: 72.5%
	Others: 1.3%
E-community experience	<1 year: 28.8%
	1-3 year: 45.1%
	4-6 year: 20.3%
	7-10 year: 3.3%
	Over 10 year: 2.6%
Average use time per week	<1 hour: 31.4%
	1-3 hours: 44.4%
	4-7 hours: 13.7%
	8-12 hours: 4.6%
	Over 13 hours: 5.9%

(Number of subjects=153)

B. Measure

Measurement items are adapted from the literature wherever possible. New items are developed based on the definition provided by the literature. All participants respond to a series of five-point Likert-type scaled questions (1=very disagree, 5=very agree).

The dependent variables in this study are two characteristics of knowledge sharing: (1) the quantity of knowledge shared, and (2) the quality of knowledge shared. We examined these two independently measured dependent variables based on message postings. The quantity of knowledge sharing is measured on the average volume of an individual's knowledge sharing per week. To normalize the data, however, we transformed the average volume of knowledge shared per week to five-point scale with 1=less than once per week, and 2=about once per week.

C. Validity and Reliability of the Survey

Content validity for the survey is to determine whether the survey is appropriate for measuring issues related to e-community members' knowledge sharing attitudesfrom the perspective of the Transaction Cost Theory. This is done by a panel discussion consisting of college professors with good experience in the field.

Reliability in the context is an estimate of the internal consistency and homogeneity. The measurement criterion for reliability follows Cronbach's statistics. Helmstadter [6] suggests Cronbach's Alpha = 0.5 as a minimum standard for group comparisons. The questions and constructs reliabilities are presented in Table II.

TABLE II
Summary of Measurement Variables

All items standardized alpha (α) = 0.80
Asset specificity =0.72
·Human asset specificity=0.56
·Site asset specificity=0.65
Uncertainty=0.60
·Behavioral uncertainty=0.59
·Environmental uncertainty=0.55
Knowledge sharing contribution=0.81
·Quantity of knowledge=0.71
·Quality of knowledge=0.80

IV. Data Analysis

Table III and Table IV present descriptive statistics and correlations between variables respectively.

TABLE III
Descriptive Statistics

Variable	Means	S.D.
Human Asset Specificity	13.44	2.05
Site Asset Specificity	18.66	2.51
Behavioral uncertainty	15.68	2.50
Environmental uncertainty	11.30	2.05
Quantity of knowledge shared	7.99	1.90
Quality of knowledge shared	30.18	3.60

TABLE IV
Correlations between Variables

Variable	HAS	SAS	BU	EU	KQN	KQA
HAS	—					
SAS	0.44**	—				
BU	0.18*	0.3**	—			
EU	0.64	0.12	0.19*	—		
KQN	0.14	0.19*	0.57	-0.19*	—	
KQA	0.22**	0.34**	0.37**	-0.36	0.43**	—

N=153; †p<0.10; *p<0.05; **p<0.01

[a] HAS= Human Asset Specificity; SAS= Site Asser specificity; BU= Behavioral uncertainty; EU= Environmental uncertainty; KQN= Quantity of knowledge shared; KQA= Quality of knowledge shared

ANOVA is used to test for differences in the respondents' gender, age, education, job, e-community experience, and average use time per week. The results indicate that no significant differences are found in respondent's age (F=1.057, n.s.), education (F=0.676, n.s.), and job (F=1.380, n.s.). However, the average use time has significant difference to the knowledge sharing contribution (F=5.094, p<0.01), but gender (F=3.912, p<0.05)) and e-community experience (F=4.446, p<0.002) have significant difference only to the quantity of knowledge shared.

The hypotheses are tested using multiple regression analysis. For each hypothesis, regression models are run separately for each of the dependent variables of knowledge sharing contribution and its determinants (Fig. 1). The overall regression model is significant (F=9.022, p<0.000). The value of R^2 (0.20) suggests that 20 percent of the variance is explained by the four variables. Another concern of this model is the multicollnearity that may exist among the independent variables [8]. The variance-inflation factor (VIF) collinearity diagnostic is used to identify possible problems due to multicollinearity in the models. The estimated results show that the VIF measure of each independent variable is far below 10 [9] (human asset specificity = 1.248, site asset specificity = 1.331, behavioral uncertainty = 1.133, environmental uncertainty = 1.044). This suggests that multicollinearity does not present a problem in making inferences. The regression results and the summary of regression analysis are presented in Table V and Table VI, respectively.

TABLE V (A)
REGRESSION ANALYSIS FOR HYPOTHESES

Variables	Quantity of Knowledge Shared	Quality of Knowledge Shared
Site Asset Specificity (H1a, b)	R^2=0.020 Adj-R^2=0.014 β=0.14† (1.89)	R^2=0.049 Adj-R^2=0.043 β=0.222** (3.52)
Human Asset Specificity (H2a, b)	R^2=0.035 Adj-R^2=0.028 β=0.187* (1.872)	R^2=0.116 Adj-R^2=0.111 β=0.341** (3.396)
Behavioral Uncertainty (H3a, b)	R^2=0.003 Adj-R^2=-0.003 β=0.057 (1.901)	R^2=0.135 Adj-R^2=0.129 β=0.367** (3.360)

TABLE V (B)
REGRESSION ANALYSIS FOR HYPOTHESES

Variables	Quantity of Knowledge Shared	Quality of Knowledge Shared
Environmental Uncertainty (H4a, b)	R^2=0.037 Adj-R^2=0.030 β=-0.1918* (1.87)	R^2=0.001 Adj-R^2=-0.005 β=-0.036 (3.6104)

†p<0.10; *p<0.05; **p<0.01
[a] Standard errors are in parentheses

TABLE VI
SUMMARY OF REGRESSION ANALYSIS

Variables	Quantity of Knowledge Shared	Quality of Knowledge Shared
Site Asset Specificity (H1)	+ (H1a)	+* (H1b)
Human Asset Specificity (H2)	+* (H2a)	+* (H2b)
Behavioral Uncertainty (H3)	- (H3a)	- * (H3b)
Environmental Uncertainty (H4)	- * (H4a)	- (H4b)

+=positive relationship ; - =negative relationship.
* indicates the supported hypotheses.

Table V reveals the following findings:

1) Site Asset Specificity is significantly associated with quality of knowledge and quantity of knowledge shared, thus supports H1.
2) Human Asset Specificity is a major determinant in quantity of knowledge and quality of knowledge shared, thus supports H2.
3) Behavioral Uncertainty is only partially related to knowledge sharing contribution, thus only partially supports H3. Note that behavioral uncertainty has no effect on quantity of knowledge shared.
4) Environmental Uncertainty has no effect on quantity of knowledge shared, indicating the lack of support for H4b. However, environmental uncertainty is negatively associated with quantity of knowledge shared, so H4a is supported. This means that the quantity of knowledge shared will be lower when environmental uncertainty is higher.

The modified research model is shown in Fig. 2.

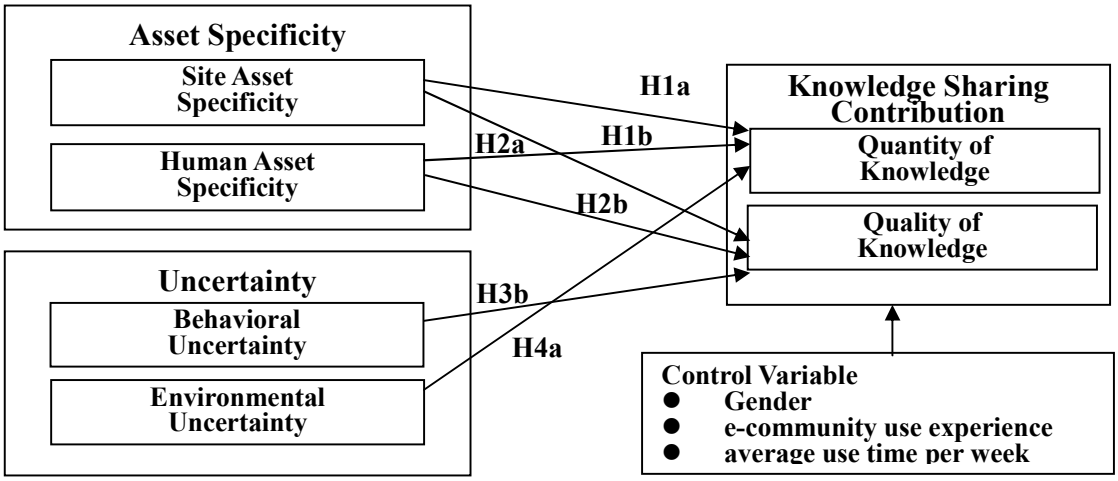

Fig. 2 Modified research model

V. Conclusion

Previous studies have shown several approaches to answering the knowledge sharing questions in organizations. In e-communities, however, their members lack face-to-face interaction and may not share a common mission or norms as would members of a formal organization. This study hopes to answer the important questions such as "Why would an individual want to share privately owned knowledge?", "Why would an individual want to share privately owned knowledge in a particular e-community?" In order to advance our understanding of knowledge sharing in e-communities, this study identified facets of Transaction Cost Theory as the determinants of knowledge sharing contribution. Knowledge sharing contribution in the proposed research model consists of two components—quantity of knowledge shared and quality of knowledge shared. We find that knowledge sharing contribution is influenced by human asset specificity, site asset specificity, behavioral uncertainty, and environmental uncertainty. However, behavioral uncertainty and environmental uncertainty only have partial significant effect on knowledge sharing contribution.

Our results imply that TCT components are significant predictors of individuals' knowledge sharing in terms of quantity. For the managers who are interested in developing and sustaining knowledge sharing through e-communities should develop strategies or mechanisms to retain human resource and maintain e-community physical assets regularly. In addition, e-community managers should provide an effective plan to continuously improve environment. They also should aim for creating a safe environment for membersto share their knowledge.

For academics, the examination of TCT in conjunction with knowledge sharing in e-communities is an innovative contribution to the literature. Knowledge management researchers may benefit from the framework and results of the quantitative study to expand upon TCT, knowledge sharing, and e-communities research.

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