



Withholding effort in knowledge contribution: The role of social exchange and social cognitive on project teams

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ARTICLE INFO

Article history:

Received 31 May 2007

Received in revised form 11 November 2008

Accepted 8 February 2010

Available online 18 February 2010

Keywords:

Knowledge contribution

Self-efficacy

Social cognitive theory

Social exchange theory

Withholding effort

ABSTRACT

Few investigations have been made to determine what factors influence people in withholding knowledge from their colleagues. We created a construct, *knowledge withholding* (KW), defined as the likelihood that individuals contribute less knowledge to others in the organization than they could. We have formulated a model, based on social exchange theory and social cognition theory, to analyze the antecedents of KW from both personal and contextual perspectives. The contextual influencers were subdivided into dimensions of rational choice, normative conformity, and affective bonding to help in understanding KW. Results of a survey of 162 MIS alumni of a university, who had experienced software development, trust, distributive justice, and team-related work showed that personal outcome expectations had a substantial influence on KW.

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1. Introduction

Withholding effort (WE) is the likelihood that an individual will give less than full effort to a job-related task. It is the common denominator of shirking, job neglect, social loafing, and free riding, which all involve an individual's WE while performing a task. *Shirking* focuses on the individual's lack of a full effort in contribution, whereas *job neglect* involves partial or full withdrawal from job-related duties, and both focus on a context where an individual employee is working alone. *Social loafing* involves holding back effort, whereas *free riding* occurs when the individual enjoys the benefits without contributing, and both focus on processes that occur in group contexts. Overall, our study focused on the general WE which encompasses varied tasks, settings, and individual predispositions, whereas shirking, job neglect, social loafing, and free riding describe specific reasons and contexts in which effort is withheld.

A number of papers have stated that individuals are prone to WE when they participate in group tasks, especially in the context of knowledge contribution. Individuals who provide knowledge often feel that this devalues their contribution while benefiting other people in the group [7]. The value of an individual's shared knowledge is often difficult to judge; knowledge with a contextual nature is complicated and hard to express, and, individuals receive

an unearned part of every other member's shared knowledge during group discussion, regardless of their own contribution. Therefore, in the absence of coercion or appropriable inducements, individuals will tend to withhold knowledge.

To gain insight into WE in knowledge contribution, we created a theoretical construct, knowledge withholding (KW), defined as the likelihood that an individual will give less than full effort to contributing knowledge; one of the research streams related to KW is in knowledge sharing, which has been studied by probing the issue from a relatively positive perspective, based on theories of trust, social capital, reward expectation, task-technology fit or IS success model [3].

A negative perspective evinces different research models and constructs of knowledge sharing; this often uses primary variables, such as procedural justice, distributive justice, task visibility, punishment, and conflict (see Table 1), which are considered influential to withholding behavior. However, they are rarely used in traditional knowledge sharing research [10]. Positive behavior variables are not the opposite of negative behavior variables; for example, theories and variables of user resistance research (such as perceived uncertainty, perceived inequity, perceived power loss, and perceived distrust) are not the same as theories and variables of user acceptance research (such as perceived ease of use and perceived usefulness).

Following recent taxonomy of research on WE [20], we analyzed the antecedents of KW from personal and contextual perspectives. Furthermore, the contextual influencers were subdivided into dimensions of rational choice, normative conformity, and affective bonding to understand KW through a systematic

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Table 1
Summary of studies on withholding effort.

Author	Study content	Antecedents (significance)
[15]	Based on social exchange theory	Control variables
		(–) Task visibility (N.S.)
		(–) Negative affectivity (N.S.)
[19]	Based on agency theory	Affective bonding
		(–) Leader-member exchange (S.)
		(–) Team-member exchange (N.S.)
[9]	Based on agency theory and social exchange theory	Rational choice
		(+) Group size (S.)
		(+) Goal conflict (S.)
[16]	Address concerns about the sustainability of the open source content model	(–) Monitoring arrangements (S.)
		(–) External competition (S.)
		Rational choice
[16]	Address concerns about the sustainability of the open source content model	(+) Centralization (S.)
		Normative conformity
		(–) Formalization (S.)
[16]	Address concerns about the sustainability of the open source content model	Affective bonding
		(–) Interaction (S.)
		Personality
[16]	Address concerns about the sustainability of the open source content model	(–) Fairness × justice (S.)
		Context
		(–) Perceived justice (S.)
[16]	Address concerns about the sustainability of the open source content model	(–) Intrinsic motivations (S.)

(+) is for positive relationship; (–) is for negative relationship.

analysis. Focusing on those WE factors that have centered on behaviors such as product selling [11], we attempted to identify how such relationships are built, extending their application to the field of KM, and determining which factors were the most important.

2. Theoretical background and hypotheses

2.1. Antecedents of withholding effort (WE)

Table 1 shows two streams of research. The first, because contextual factors are complex and often lack a systematic view, we used rational choice, normative conformity, and affective bonding incentives to explain the impact of organizational context on group members' WE; this is consistent with agency theory, which stresses control. It is also, because of a social exchange perspective, stressed interpersonal relationships [9]. The second adopted a holistic view involving personal motivations and contextual influencer variables to explain group member's WE in organizations.

The purpose of our study was to integrate these two to form a KW research model (as shown in Fig. 1).

2.2. Rational choice, normative conformity, and affective bonding in KW

Rational choice, assumes that people (managers or principals) adjust their control and monitoring activities to maximize their workers' (employees or agents) utility under varying contexts. When the principal has sufficient information to verify the behavior of the agent, he or she is likely to behave in the interests of the principal. Otherwise, individuals withhold effort. Researchers adopting this view have indicated that task visibility and group size are the most important factors.

Group size represents a team's structure and composition. Prior research suggested that group size was likely to have a negative effect on information-sharing, because an increased group size allows its members to escape from contributing. Increased group size also makes it more difficult to assess each individual's contribution. Studies have also suggested that smaller group sizes

allow individuals to feel that their contribution is more crucial to the success of the process. Therefore, we proposed:

H1. Increase in group size is positively related to KW.

Task visibility is the perceived belief that a supervisor is aware of a member's effort in the knowledge being shared. Individuals are less inclined to expend effort when they feel that their individual contribution cannot be identified by their supervisor. Supervisory control has an impact on an individual's willingness to share knowledge, because its control is needed in order to align the goals of the employer and employee. The level of visibility of an individual employee's contribution effort depends mainly on whether the shared knowledge can be monitored and evaluated. When supervisors impose sanctions on KW, an employee would work hard on sharing his knowledge, i.e., he or she makes rational choice not to free ride. Therefore, we hypothesized:

H2. Task visibility is negatively related to KW.

Normative conformity, in which an individual is motivated to adhere to standards of conduct grounded in socially instilled values about principled behavior, and *affective bonding*, which evolve as parties in a relationship interact and mature over time. Collectively are consistent with social exchange theory (SET). Normative conformity occurs due to a set of unwritten expectations about employment relationships, while affective bonding motivates people to provide effort based on their emotional attachments to others. These have developed as part of the social exchange process, providing motivation to reduce WE.

SET explains human behavior primarily in terms of social exchange, assuming that some sort of obligation to reciprocate is expected whenever one receives benefits from another's contribution. Such exchanges are relatively long-term relationships (e.g., personal obligation, gratitude, and trust) as opposed to immediate ones [8]. In the context of WE, when individuals are in a high-quality relationship, they will behave in ways that will benefit their exchange partners, such as performing better and exerting extra effort, even if they are not immediately rewarded for such behavior. Furthermore, social exchange, by emphasizing how

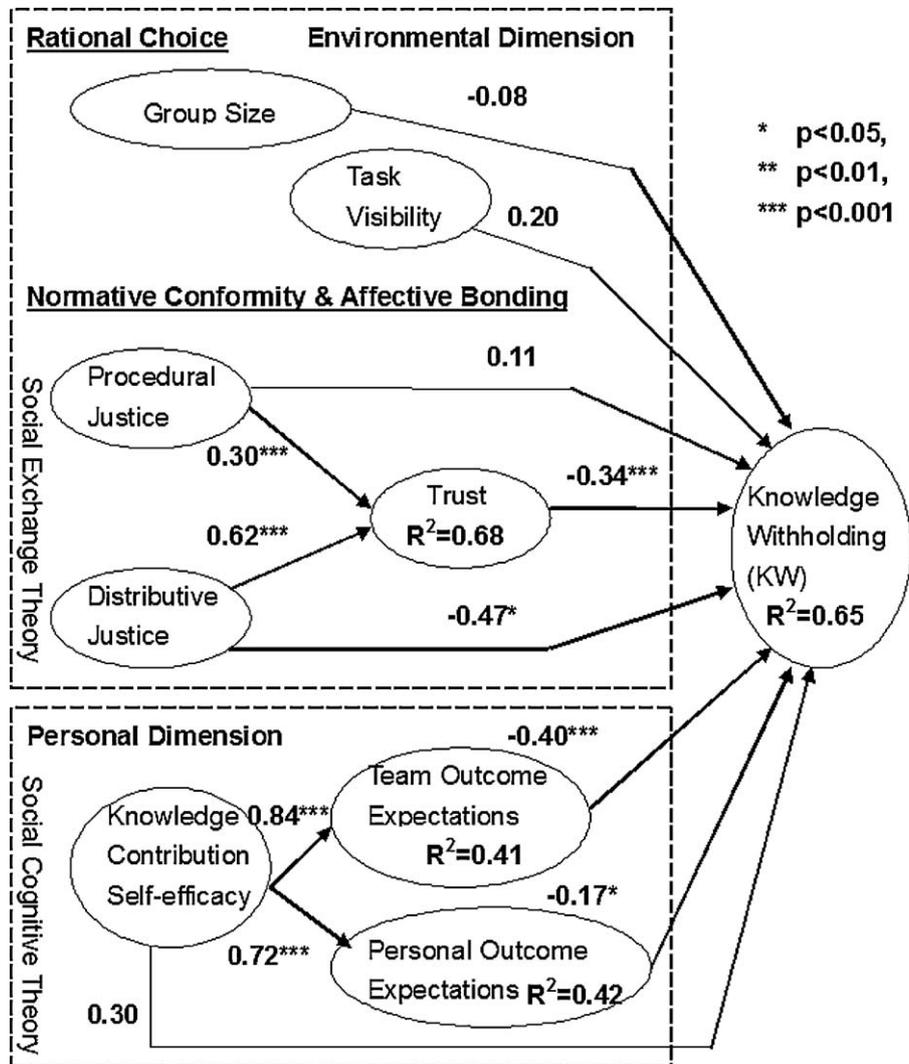


Fig. 1. Research model for KW.

social ties can alter an individual's willingness to act in another party's interest, forms a force that offsets the incentive to engage in WE. However, SET provides a rationale for retaliation; when individuals feel that they have been treated unfairly, they attempt to "get even" by retaliating. Accordingly, procedural justice (PJ) (the perceived fairness of the formal decision-making procedures used by a group [5]) and distributive justice (DJ) (the perceived fairness of outcomes or rewards that an employee receives from the organization), as well as trust between members in affective bonding are the primary social antecedents of WE.

Equity theory suggests that individuals are sensitive to others receiving similar rewards for less effort, and that the effort may be adjusted to reflect individual perceptions of fairness. PJ can tell members that they are valued by the group and thus create an environment in which task performance is improved. Chiu et al. [4] argued that the methods of decision-making may be more important than the actual decision; if individuals believe the procedures used to make the decisions are fair, they are likely to be satisfied with the decision. Otherwise, they refuse to cooperate by hoarding their knowledge. Therefore:

H3. Procedural justice is negatively related to KW.

Distributive justice exists when a person's expectations (based on some rule) are congruent with the rewards; these give employees feedback on their perceived competence and effective-

ness. Individuals reduce their effort when they feel that they are not receiving equitable resources and/or rewards from the organization. When employees perceive distributive injustice, they withhold knowledge more. Therefore:

H4. Distributive justice is negatively related to KW.

Trust is based on the expectation that another person will perform a particular action important to the trustor. Trust stems from emotional attachment between a trustor and a trustee and therefore, is relevant to members' psychological and emotional reasons for joining, staying with, and contributing knowledge to project teams [21]. People who are connected by mutual affection and emotion are less likely to withhold knowledge. People having a high quality relationship with their team members will reciprocate to show that they value the relationship. Therefore:

H5. Trust is negatively related to KW.

Feelings of trust are likely to be affected by the relative treatment of others and by opportunities available within a person's occupational group. Pillai et al. [17] argued that, when distribution of organizational outcomes is considered fair, higher levels of trust are likely to ensue. Otherwise, a lack of distributive justice will bring about grumbling over unfair or poorly distributed rewards and complaints may trigger anger and mistrust between co-workers.

Assessments of trust depend on perceptions of the fairness of allocations and outcomes and also about the procedures used to arrive at them. Individual members' practice of procedural justice (PJ), allows some right in the decision making process, which is usually an effective antidote to emotional hurt or mistrust between members [12]. Thus the more the group decision is perceived to be procedurally fair, the more likely that the individual will trust other group members. Therefore:

H6a. Procedural justice is positively related to trust.

H6b. Distributive justice is positively related to trust.

2.3. Personal dimensions in KW

Social cognitive theory (SCT) has been used to explain personal motivations in the context of KMS usage [13], knowledge sharing, collaborative learning, and e-Commerce. It argues that a person's behavior is partially shaped and controlled by the influences of the social network and the person's cognition (expectations and beliefs) and that thoughts are not disembodied and thus cognitive processes, which are influenced by social factors, are activities that exert determinative influence [2]. Accordingly, people acquire and maintain certain behavioral patterns which are the basis for intervention strategies. Therefore, perceived social loafing by others causes and heightens the WE by engendering the wish not to be exploited by others, i.e., WE is believed to stem from social cognitive variables [22].

Of the personal factors are self-efficacy, the belief in one's ability to organize and execute actions to manage the situation, and outcome expectations. Judgment of the likely consequence of such a behavior, is considered most important. SCT notes that expectation of positive outcomes is meaningless if the user feels unable to execute it successfully. In the context of WE, these two factors have also been found to be important because they are function of both the anticipated outcomes of performing an act and the efficacy expectations. Therefore, they are considered important antecedents of KW.

Knowledge contribution self-efficacy (KCSE) is confidence in one's ability to provide knowledge that is valuable to the group. Self-efficacy influences choices about the behavior to be undertaken, the effort and persistence exerted in the face of obstacles to the performance of the behaviors, and thus the mastery of the behavior. The higher the perceived ability of an employee's task-related knowledge, skills, and abilities, the higher the level of effort that the person is willing to offer. Therefore, an individual with high knowledge self-efficacy tends to have an outlook which produces personal accomplishments, reduces fear of losing knowledge power, and lowers vulnerability to withholding knowledge. Thus individuals with a strong sense of self-efficacy are better at performing their job. Several studies have also indicated that there is a negative relationship between perceived self-efficacy and levels of dispute [1]. Therefore:

H7. Knowledge contribution self-efficacy is negatively related to KW.

Outcome expectations may be personal, such as pleasure or the benefit derived from knowledge sharing, or team-related, such as improved project performance.

Without incentives, people are seldom willing to spend their time and effort in making contributions. Anticipated benefits give people spiritual support about their effort on the task. Therefore, individuals with higher outcome expectations would be less likely to loaf on a cognitively engaging task. As far as the team outcome expectation as concerned, many IS researchers have examined the relationship between knowledge sharing and a project team's

outcomes; they determined to provide that knowledge sharing improved team outcomes. It and knowledge integration, strongly, positively affect IS project's product and process performance and others have found that the integrative activities of user and project managers have a positive impact on timely project completion. The efficient reuse of existing knowledge held by individual team members improves software quality. Tiwana and McLean [23] showed that relational capital and absorptive capacity affect knowledge sharing and integration, and knowledge integration affects team's creativity; knowledge integration is positively and directly related to creativity in ISD teams. Victoria [6] showed that the IT project manager's ability to share internal and external knowledge was directly and positively related to the probability of on-time project completion. Thus team members expect that their unselfish knowledge contribution will enhance team's performance. Therefore:

H8a. Team-related outcome expectations are negatively related to KW.

As far as personal outcome expectation is concerned, an individual's behaviors are chiefly motivated by self-interest. Some researchers have suggested that with the expectation of making friends and strengthening ties with them, people are willing to share knowledge. Therefore:

H8b. Personal outcome expectations are negatively related to KW.

Consistent with social cognitive theory and MIS studies, self-efficacy is positively related to outcome expectation. People who share valuable knowledge are more likely to expect positive team-related and personal outcomes than those who doubt their capabilities. Therefore:

H9a. Knowledge contribution self-efficacy is positively related to team outcome expectation.

H9b. Knowledge contribution self-efficacy is positively related to personal outcome expectation.

3. Research methodology

3.1. Sampling procedure

We used a survey method to test our research model. The unit of analysis was an individual member who has experience of software development representing his or her group. During software development, individuals often meet problems which must be solved through a process of collaborative knowledge sharing between team members. If all members of the team withhold knowledge, the software product is unlikely to satisfy user needs, there will probably be reduced productivity through defects and rework, additional resources will be needed, deadlines will be missed and finally, there will be disagreements in the team.

Samples were solicited from 300 people who had been randomly selected from a list of 1000 MIS alumni of a university; they all worked in either local or multi-national companies in Taiwan. In the e-mail welcoming and thanking them for participating in the survey, a hyperlink was inserted to our online survey web pages from 1 May to 31 May 2008. On the front of the web-pages, we explained our goal and advised the respondents that we would ensure their privacy when analyzing results of the questionnaire. The participants were asked to answer our questionnaire based on the *software development team that they had most recently joined*. In the open questionnaire, over 80% of the participants indicated that their project meetings were primarily conducted face-to-face (with a few sometimes online). The average number of meetings was two per week. We asked all participants

Table 2
Demographic characteristics of the sample.

Demographic variable	Sample composition (N = 162)	
Gender	Male	115 (71.0%)
	Female	47 (29.0%)
Education	College (2 years)	17 (10.5%)
	Bachelor (4 years)	77 (47.5%)
	Master	60 (37.0%)
	Ph.D.	8 (5.0%)
Industry	Manufacturing	35 (21.6%)
	Service	18 (11.1%)
	Hospital	11 (6.7%)
	Government	17 (10.5%)
	Information technology	47 (29.0%)
	Finance	10 (6.2%)
	Education	17 (10.5%)
	Others	7 (4.4%)
	Project age	Less than 3 months
4–6 months		44 (27.2%)
7–12 months		44 (27.2%)
13–18 months		22 (13.6%)
19–24 months		10 (6.2%)
25–36 months		13 (8.0%)
More than 37 months		9 (5.5%)
Group size	2–3 members	17 (10.5%)
	4–5 members	49 (30.2%)
	6–7 members	34 (21.0%)
	8–9 members	14 (8.7%)
	10–11 members	24 (14.8%)
	12–13 members	5 (3.1%)
	More than 14 members	19 (11.7%)

to answer all the questions. There were no missing values in any response. Furthermore, respondents were offered, as an incentive, a customized report that summarized the results. Overall, of the 300 emails that had been sent, all 162 replies were analyzed, giving a response rate of 54%. The prime reason for nonparticipation was that their time on the project was too short (e.g., less than one month) or their e-mail address was invalid.

Demographic information on the projects and participants is shown in Table 2. Over 90% held a bachelor degree, indicating that most were knowledge workers. In addition, participants showed a good distribution of their industry, group size, and project age.

3.2. Operationalization of constructs

To ensure content validity of the scales, we used previously verified survey questions, some modified for our context. Table 3 summarizes the definition and their sources. All questions in the instrument were measured using seven-point Likert scales from “strongly disagree” (1) to “strongly agree” (7).

The questionnaire was administered in Chinese and thus it had to be translated; backward translation was used to ensure

Table 3
Formal definitions of constructs.

Construct (Abbr.)	Definition	Author
Task visibility (TV)	The belief that the supervisor is aware of an individual's effort exerted on the job.	
Procedural justice (PJ)	The perceived fairness of the decision-making procedures used in the group.	[5]
Distributive justice (DJ)	The perceived fairness of outcomes or rewards that members receive from the organization.	[5]
Trust (TRU)	The degree to which a member believes other team members will act in his or her best interest.	[14]
Knowledge contribution self-efficacy (KCSE)	The confidence in one's ability to provide knowledge that is valuable to the work group.	[8]
Personal outcome expectations (POE)	The knowledge contributor's judgment of the likely consequences that his or her knowledge sharing may bring to himself or herself.	[13]
Team-related outcome expectations (TOE)	The knowledge contributor's judgment of the likely consequences that his or her knowledge sharing behavior will cause to the team.	[3]
Knowledge withholding (KW)	The likelihood that an individual will give less than full effort on contributing knowledge.	

consistency between the Chinese and the original English versions of the instrument. Three research assistants majoring in English linguistics were employed to check the translation; versions were then compared and discrepancies resolved by a committee including an English professor and the three RAs.

A pretest using the Chinese questionnaire was performed by 10 experts in KM and project management (PM) to assess its logical consistency, ease of understanding, sequence, and contextual relevance. The comments of these experts led to some minor modifications of the wording and item sequence.

A pilot study was then conducted using seven Ph.D. students whose research area were all related to KM/PM and forty master's students whose major was MIS; all had experienced work in project groups. Three items, because of their low loading, were ultimately deleted: two were items for complexity of task visibility, and the other for KW. Comments and suggestions on the item contents and structure of the instrument were solicited.

3.3. Assessing non-response and common method biases

A time-trend extrapolation test examined nonresponse bias by comparing early and late respondents on a multivariate ANOVA of all the variables of construct items and demographic data as gender, age, work position, frequency of meeting time, etc. Early 25% and late 25% respondents indicated no significant differences (Wilks' Lambda = 0.35; $p = 0.73$). Therefore, the non-response bias was not a major problem.

To overcome the concern of common method bias in the survey design, questionnaire items were arranged so that the dependent variable followed rather than preceded the independent variables. Then, Harman's single-factor test was used. The results revealed 9 factors with an Eigenvalue greater than one and no single factor explained most of the variance (i.e., the variances explained ranged from 2.7% to 14%). Such results are consistent with the absence of a significant variance common to the measures. Finally, a partial correlation method was employed, following Podsakoff and Organ [18]; the first factor from the principal components analysis was entered into the PLS model as a control variable on all dependent variables. This is assumed to contain the best approximation to the common method variance if it is a general factor on which all variables load. The factor did not produce a significant change in variance explained in any of the dependent variables, indicating a lack of common method bias. Thus common method bias was apparently not a problem in our study.

4. Data analysis and results

4.1. Assessment of the measurement model

Data analysis was carried out in two stages—the measurement and the structure model. The first step was to assess the construct validity for the nine measurement elements using PLS analysis. The

internal consistency of each dimension was assessed by computing the Cronbach's alpha. As shown in Table 4, its lowest value was 0.93 for task visibility; thus all well exceeded the normal criterion of 0.70.

Thus all of the items had loadings over 0.70 for their respective constructs. In addition, as shown in Table 5, the CRs for the constructs with multiple items ranged from 0.96 to 0.98 and the AVEs ranged from 0.81 to 0.88. All are well above the cutoff, showing acceptable convergent validity.

For satisfactory discriminant validity, the AVE for a construct should be greater than the squared correlations of the construct and other constructs in the model. The diagonal elements represent the square root of the variance shared between the constructs and their measures. The off-diagonal elements are the correlations among the constructs. All diagonal elements were greater than their corresponding off-diagonal elements, suggesting that the respective constructs exhibited acceptable discriminant validity.

Table 4

Summary of measurement scales.

Construct	Measure	Loading
Task visibility Cronbach's alpha = 0.93		
TV1	The supervisor is generally aware of the amount of project work a member does.	0.93
TV2	It is easy for the supervisor to figure out how hard a member is working on project work.	0.96
TV3	It is easy for the supervisor to determine how much effort a member exerts on project work.	0.93
Trust Cronbach's alpha = 0.96		
I believe that our team members...		
TRU1	Are very concerned about each other's welfare.	0.93
TRU2	Place a high premium on each other's needs and desires.	0.91
TRU3	Would not knowingly do anything to hurt each other.	0.90
TRU4	Really look out for what is important to each other.	0.94
TRU5	Will go out of his/her way to help each other.	0.94
Procedural justice Cronbach's alpha = 0.95		
When our team are making decisions...		
PJ1	The concerns of all members affected by the decisions are heard	0.93
PJ2	Opportunities are provided to appeal or challenge the decisions	0.93
PJ3	Requests for clarification and additional information about the decisions are allowed	0.92
PJ4	Members' complaints are handled in a very timely manner.	0.91
PJ5	Members' complaints are resolved as quickly as it should be.	0.91
Distributive justice Cronbach's alpha = 0.96		
Members in the work group are fairly rewarded...		
DJ1	For the investments in time and energy that he/she has made in project work.	0.92
DJ2	For the roles of project work assigned to him/her.	0.93
DJ3	Compared to what our team earns from his/her work.	0.92
DJ4	For the amount of project work he/she puts forth.	0.96
DJ5	Considering the responsibilities, stresses and strains of project work he/she has.	0.95
Knowledge contribution self-efficacy Cronbach's alpha = 0.95		
I have confidence in my ability to:		
KCSE1	Provide knowledge that people I work with consider valuable.	0.93
KCSE2	Provide knowledge that people I work with consider informative.	0.94
KCSE3	Provide knowledge that people I work with consider helpful.	0.96
KCSE4	Be informed to provide valuable knowledge.	0.84
KCSE5	Have the expertise needed to provide valuable knowledge.	0.93
Personal outcome expectations Cronbach's alpha = 0.97		
Sharing my knowledge will:		
POE1	Help me make friends with other members in the work group.	0.92
POE2	Give me a feeling of happiness.	0.95
POE3	Build up my reputation in the work group.	0.95
POE4	Give me a sense of accomplishment.	0.95
POE5	Strengthen the tie between me and others in the work group.	0.94
POE6	Enable me to gain better cooperation in the future from outstanding members in the work group.	0.91
Team-related outcome expectations Cronbach's alpha = 0.97		
Sharing my knowledge will help my work group:		
TOE1	Have more capability to meet project goals.	0.95
TOE2	Produce more amount of knowledge.	0.94
TOE3	Produce higher quality of knowledge.	0.94
TOE4	Adhere closer to project schedules.	0.88
TOE5	Have higher efficiency of operations.	0.95
TOE6	Have higher speed of operations.	0.94
KW Cronbach's alpha = 0.95		
In group discussion for knowledge sharing...		
KW1	I contribute less knowledge than I know I can.	0.70
KW2	I give less effort on knowledge contribution than other members.	0.96
KW3	I often leave contributing knowledge to other members.	0.94
KW4	I often take advantage of other members' knowledge without contribution.	0.95
KW5	I avoid contributing knowledge as much as possible.	0.90

Table 5
Discriminant validity and correlations.

Cons.	AVE	CR	Construct (Cons.)									
			GS	TV	PJ	DJ	TRU	TOE	POE	KCSE	KW	
GS	1	1	1									
TV	0.88	0.96	-0.12	0.94								
PJ	0.84	0.96	0.01	0.45	0.92							
DJ	0.88	0.97	0.00	0.39	0.74	0.94						
TRU	0.85	0.97	0.02	0.37	0.72	0.80	0.92					
TOE	0.87	0.98	0.02	0.42	0.68	0.72	0.68	0.93				
POE	0.87	0.98	-0.01	0.42	0.71	0.72	0.67	0.81	0.93			
KCSE	0.84	0.96	0.06	0.53	0.47	0.51	0.49	0.64	0.65	0.92		
KW	0.81	0.96	-0.03	-0.14	-0.57	-0.71	-0.69	-0.67	-0.64	-0.35	0.90	

*Diagonal elements are the square root of AVE. These values should exceed the inter-construct correlations for adequate discriminant validity. CR: composite reliability; AVE: average variance extracted; TV: task visibility; PJ: procedural justice; DJ: distributive justice; TRU: trust; TOE: team-related outcome expectations; POE: personal outcome expectations; KCSE: knowledge contribution self-efficacy; KW: knowledge withholding; GS: group size.

We also checked for multicollinearity and the resultant variance inflation factor (VIF) for all the constructs were acceptable (between 1.5 and 3.8). In addition, all the measure items loaded higher on their own construct than on other constructs in the model. Therefore, the items demonstrated satisfactory convergent and discriminant validity.

Criterion-related validity shows how closely the items in the instrument are related to the KW construct. The item measuring overall KW (“In general, contributing knowledge to the team is not

a major concern of mine.”) was used as a criterion scale if all other KW items in the measurement were correlated with it. All correlation coefficients were positive (>0.7) and significant at the 0.01 level. Thus it was acceptable.

4.2. Assessment of the structural model

The hypotheses, the paths between the items, and the latent constructs were examined using LISREL 8.70. The normed χ^2 was

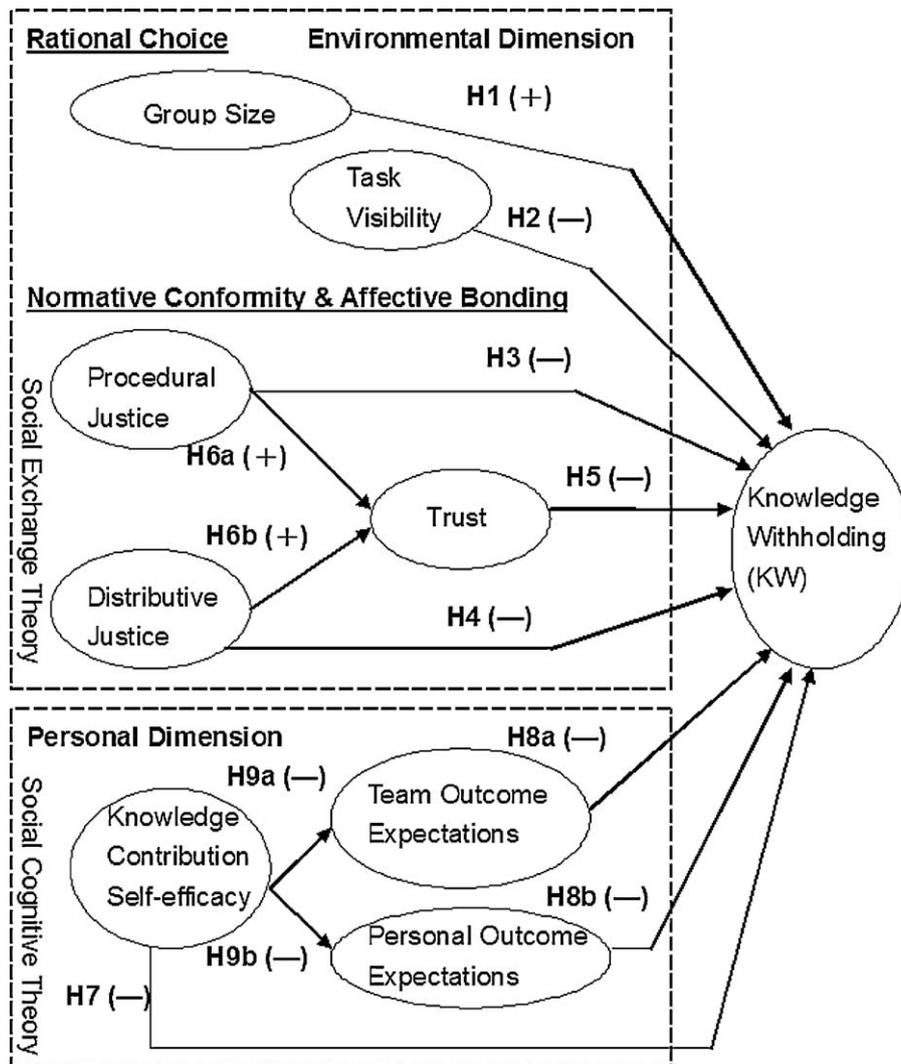


Fig. 2. KW structural model result.

2.8 ($\chi^2 = 2080$, $df = 758$), which is within the recommended level of 3.0, while the structural model exhibited a fit value satisfying the commonly recommended threshold for its respective indices, thus providing evidence of a good model: NNFI was 0.97, CFI was 0.97 and RMSEA was 0.089.

Fig. 2 shows the path coefficients. Trust ($\beta = -0.34$, t -value = -3.31), distributive justice ($\beta = -0.47$, t -value = -2.04), team-related outcome expectations ($\beta = -0.40$, t -value = -5.11) and personal outcome expectations ($\beta = -0.17$, t -value = -1.96) all demonstrated significant relationships with KW. Therefore, hypotheses 4, 5, 8a and 8b were supported. However, group size, task visibility, procedural justice, and knowledge contribution self-efficacy had non-positive relationship with KW. Therefore, hypotheses 1, 2, 3 and 7 were not supported. The R^2 value for KW was 0.65.

In addition, both team-related outcome expectations ($\beta = 0.84$, t -value = 10.5) and personal outcome expectations ($\beta = 0.72$, t -value = 9.9) were significantly influenced by knowledge contributing self-efficacy. Therefore, hypotheses 9a and 9b were supported. The percentages of the variance explaining (R^2) of personal and team-related outcome expectation were 42% and 41%, respectively.

Finally, as for the pre-determinants of trust, procedural justice ($\beta = 0.30$, t -value = 3.99) and distributive justice ($\beta = 0.62$, t -value = 6.64) showed a significant positive relationship. Therefore, hypotheses 6a and 6b were supported. The percentage of the variance explaining (R^2) of trust was 68%.

5. Discussion

5.1. Findings

The goal of our study was to construct a theoretical KW-model from a personal and contextual perspectives in which contextual factors are subdivided into dimensions of rational choice, normative conformity, and affective bonding. The results indicated that KW is influenced by trust and distributive justice in the environmental dimensions as well as team-related and personal outcome expectations. However, group size, task visibility, procedural justice in environment dimension, and contribution self-efficacy did not have a significant impact on KW intention.

When people perceived that their salary is fair, they will be more willing to contribute what they know. However, the insignificant relationship between procedural justice and KW implied that this would influence an individual member's KW.

Under the addition of trust as a mediating variable in our study, the influence of procedural justice was fully mediated; we believe that the influence is indirect and that a more important, direct influence comes from trust, where everyone is allowed to participate in decision making, thereby removing selfish KW intention.

Trust had a positive impact on KW. When members care about each other, an individual will be more willing to spend effort in giving knowledge. However, apparently contributing valuable knowledge is different from really sharing it with others; personal and team-related expectations have significant impact on KW.

Our findings suggest a divergence between effort and KW in the effect of group size or visibility of the task.

5.2. Theoretical and practical implication

Traditionally, knowledge contribution/sharing was studied from a positive perspective. We departed from this by examining KW from a negative perspective. Thus the contribution of our study differs substantially from traditional work.

Our study used a framework of rational choice, normative conformation, and affective bonding to integrate social cognition and exchange theories, in conjunction with KW intentions. This

allowed our model to be robust, firm, and all encompass a theoretical base.

If a team wishes its members to contribute their most valuable knowledge voluntarily and unselfishly, the project manager should place importance on the following:

1. When team members feel that they are not fairly rewarded, they are more likely to withhold knowledge. Therefore, management should be cautious when deciding member rewards. In order to enable members to perceive fair distributive justice, and thus, minimize KW intentions.
2. When team members trust one another, they are concerned about the group's welfare, place a high premium all needs and desires, etc., they will be aware of daily issues important to one another and respond naturally. In such an atmosphere, members decrease their KW intention.
3. When individuals think that their knowledge is under-appreciated, they are unlikely to share knowledge. Therefore, management should communicate with all team members to create an atmosphere where members believe that their personal contributions are appreciated, acknowledged, and will bring good outcomes, and thus increase their pace of work, applying their creativity toward meeting the goals of the project.

5.3. Limitations of the study

First, an individual member was assumed to represent the project group; thus, the project team interaction, communication, and knowledge contribution might have been lost. Second, we investigated all constructs at the same time; the un-linked relationship between environmental and personal dimensions simplified the KW phenomenon in a project team. Finally, the study was based on a sample of 162 respondents in one country. A larger sample would have provided the model with more statistical power. Also, we cannot predict, from our results, the effect of culture: would the individualism of the West and collectivism of the East affect results?

References

- [1] A. Ardichvili, V. Page, T. Wentling, Motivation and barriers to participation in virtual knowledge-sharing communities of practice, *Journal of Knowledge Management* 7 (1), 2003, pp. 64–77.
- [2] A. Bandura, Social cognitive theory: an agentic perspective, *Annual Review of Psychology* 52, 2001, pp. 1–26.
- [3] C.M. Chiu, M.H. Hsu, E.T.G. Wang, Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories, *Decision Support Systems* 42 (3), 2006, pp. 1872–1888.
- [4] C.M. Chiu, C.S. Chang, H.C. Chang, Examining the integrated influence of fairness and quality on learners' satisfaction and web-based learning continuance intention, *Information Systems Journal* 17 (3), 2007, pp. 271–287.
- [5] J.A. Colquitt, B.A. Scott, T.A. Judge, J.C. Shaw, Justice and personality: using integrative theories to derive moderators of justice effects, *Organizational Behavior and Human Decision Processes* 100, 2006, pp. 110–127.
- [6] L.M. Victoria, Knowledge integration and information technology project performance, *MIS Quarterly* 30 (4), 2006, pp. 919–939.
- [7] C.P. Yu, T.H. Chu, Exploring knowledge contribution from an OCB perspective, *Information & Management* 44 (3), 2007, pp. 321–331.
- [8] A. Kankanhalli, B.C.Y. Tan, K.K. Wei, Contributing knowledge to electronic knowledge repositories: an empirical investigation, *MIS Quarterly* 29 (1), 2005, pp. 113–143.
- [9] R.E. Kidwell, A. Nygaard, R. Silkoset, Antecedents and effects of free riding in the franchisor–franchisee relationship, *Journal of Business Venturing* 22, 2007, pp. 522–544.
- [10] K.E. Kolekofski, A.R. Heminger, Beliefs and attitudes affecting intentions to share information in an organizational setting, *Information & Management* 40 (6), 2003, pp. 521–532.
- [11] R.C. Liden, S.J. Wayne, R.A. Jaworski, N. Bennett, Social loafing: a field investigation, *Journal of Management* 30 (2), 2004, pp. 285–304.
- [12] C.P. Lin, To share or not to share: modeling tacit knowledge sharing, its mediators and antecedents, *Journal of Business Ethics* 70, 2007, pp. 411–428.
- [13] T.C. Lin, C.C. Huang, Understanding knowledge management system usage antecedents: an integration of social cognitive theory and task technology fit, *Information & Management* 45 (6), 2008, pp. 410–417.

- [14] D. McAllister, Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations, *Academy of Management Journal* 38 (1), 1995, pp. 24–59.
- [15] S.M. Murphy, S.J. Wayne, R.C. Liden, B. Erdogan, Understanding social loafing: the role of justice perceptions and exchange relationships, *Human Relations* 56 (1), 2003, pp. 61–84.
- [16] O. Nov, G. Kuk, Open source content contributors' response to free-riding: the effect of personality and context, *Computers in Human Behavior* 24 (6), 2008, pp. 2848–2861.
- [17] R. Pillai, E.S. Williams, J.J. Tan, Are the scales tipped in favor of procedural or distributive justice? An investigation of the USA, India, Germany and Hong Kong (China) *The International Journal of Conflict Management* 12, 2001, pp. 312–332.
- [18] P.M. Podsakoff, S.B. Mackenzie, J. Lee, N.P. Podsakoff, Common method biases in behavioral research: a critical review of the literature and recommended remedies, *Journal of Applied Psychology* 88 (5), 2003, pp. 879–903.
- [19] A.I. Rokkan, A. Buvik, Inter-firm cooperation and the problem of free riding behavior: an empirical study of voluntary retail chains, *Journal of Purchasing & Supply Management* 9, 2003, pp. 247–256.
- [20] M. Schnake, An integrative model of effort propensity, *Human Resource Management Review* 17, 2007, pp. 274–289.
- [21] K.J. Stewart, S. Gosain, The impact of ideology on effectiveness in open source software development teams, *MIS Quarterly* 30 (2), 2006, pp. 291–314.
- [22] B. Thompson, B. Thornton, Exploring mental-state reasoning as a social-cognitive mechanism for social loafing in children, *The Journal of Social Psychology* 147 (2), 2007, pp. 159–174.
- [23] A. Tiwana, E.R. Mclean, Expertise integration and creativity in information systems development, *Journal of Management Information Systems* 22 (1), 2005, pp. 13–43.



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