# A Study on Trust Dynamics Influencing Knowledge Sharing in Organization

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#### **Abstract**

This study explores how group behavior influences knowledge sharing by conducting a process of trust dynamics development. Whether different degrees of trust among team members differ in terms of the operational development of socialization and natural form is also analyzed. An experiment was conducted from the perspective of process of trust dynamics development to understand how group behavior influences knowledge sharing. A questionnaire survey was also performed to evaluate how quantity of knowledge sharing and quality of knowledge are related.

Initial trustworthiness and early communication level influence team members in their early trust. Early trust also increases the late cohesiveness and late satisfaction of a team and, simultaneously, affects team knowledge and sharing behavior. Additionally, the communication level between the team members impacts the late cohesiveness and knowledge share quality of a team. Moreover, goal conflict, opportunism and information asymmetry significantly influence the knowledge sharing of team members. Results of this study provide a valuable reference for managers attempting to understand how trust dynamics development influences knowledge sharing among team members.

**Keywords:** Trust dynamic development, knowledge sharing, agent theory, punctuated equilibrium theory, organization behavior

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# 信任動態發展歷程影響組織知識分享之探討

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# 摘要

本研究經由信任動態發展歷程觀點探討影響團隊組織成員知識分享行為的影響因素,藉由社會化實驗操弄,可瞭解團隊行為如何影響成員知識分享行為,以及不同信任程度背景所組成的團隊組織在知識分享的效益差別。此外本研究亦利用問恭調查法進行研究假說驗證。

研究結果顯示,團隊成員早期信任感會受到初始信賴感與早期溝通層次影響,其早期信任感與晚期溝通層次會增加團隊晚期凝聚力與晚期滿意度;而團隊成員知識分享行為則會同時受到晚期溝通層次、目標衝突、投機主義、資訊不對稱等因素影響。本研究結果對於影響團隊成員知識分享行為之因素提供了另一個思考面向,可讓管理者更加瞭解信任動態發展影響團隊成員知識分享行為之歷程。

關鍵詞:信任動態發展歷程、知識分享、代理理論、間斷平衡理論、組織行為

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# 1. Introduction

As a major impetus to increase organizational efficiency, knowledge generates profits and transforms organizations, thus strengthening organizational competitiveness (Gottschalk 2000). As emergence of the knowledge economy has transformed economic activities, modern society has subsequently evolved and made unprecedented advances. In particular, knowledge sharing significantly increases competitiveness. According to Cohen and Levinthal (1990) while surpassing individual creativity, knowledge sharing among team members significantly facilitates knowledge flow, ultimately increasing organizational effectiveness. However, knowledge is abstract, complex, difficult to acquire or distribute (Barney 1991), making it difficult to be shared by organizational members who may interpret the same knowledge differently. Individual knowledge must thus be transformed into organizational assets by increasing knowledge sharing (Nonaka & Konno 1998).

Sharing knowledge requires owners to provide their individual assets as common property belonging to the teammates. Enjoying the positive effects of knowledge sharing thus motivates team members to share, either intrinsically or extrinsically (Davenport & Prusak 1998). Interpersonal trust among team members is such an impetus. Whereas most practitioners assert that mutual trust initiates effective knowledge sharing (Nahapiet & Ghoshal 1998; Tsai & Ghoshal 1998), exactly how interpersonal trust affects knowledge sharing has seldom been addressed (Holste & Fields 2010; Lucas 2005; Politis 2003). Moreover, the dynamic process of interpersonal trust and its effects on knowledge sharing have received scarce attention when adopting a longitudinal approach.

Therefore, this study explores the above limitations of the literature. Longitudinal design examines trust development in student project teams. Both objective data, i.e. communication frequencies, and subjective data, i.e. self-report questionnaires, are collected to assess how team members collaborate with each other. The first section of this study focuses on how early interpersonal trust increases team cohesiveness and fosters communication patterns among members who are unfamiliar with each other. The second section monitors how interpersonal trust influences various outcomes, including satisfaction with cooperation.

This study significantly contributes to current literature by integrating punctuated equilibrium theory (PET) and agency theory. PET describes the complexity of team

dynamics, while team environments evolve both dramatically in the short run and incrementally in the long run. The longitudinal design of this study thus elucidates such dynamics thoroughly. However, in terms of the agency theory, knowledge receivers act as agents of knowledge providers (Hendriks 1999). Again, the proposed design thoroughly elucidates how interpersonal trust and knowledge sharing are dynamically related over time.

#### 2. literature Review

#### 2.1 Trust

As the foundation of interpersonal interactions, trust requires smooth interpersonal relations. Various disciplines have investigated trust as a major element of interpersonal and inter-organizational communications (Butler 1991; Doney & Cannon 1997; Mayer et al. 1995; Serva & Fuller 2004). In addition to diminishing the uncertainty and risk that trust providers face, trust ensures that recipients receive required assistance, resources, or knowledge from the trust providers. Especially when norms and rules do not exist, trust significantly facilitates interpersonal cooperation (Luhmann 1979). Restated, interpersonal trust and uncertainty as well as risk are negatively related (Gilbert & Tang 1998; Foos et al. 2006). Through interpersonal trust, team members form mutual commitment and motivate each other, eventually identifying with group members. Moreover, shared affection, knowledge, and values can increase team identification. According to Teece (1998), team members tend to share knowledge with familiar in-groups. Similarly, Tullberg (2008) suggested that trustworthiness based on rational judgment and previous experience, rather than over optimism or unfaithful promises, accurately predicts trust behavior. Foos et al. (2006) also posit that knowledge sharing and use is facilitated by ties based on interpersonal trust among project team members.

# 2.2 Knowledge Sharing

Ryu, Ho and Han (2003) defined knowledge sharing as individual behavior that transfers personal knowledge to other members in the same organization. As a complex yet valuable framework for information analysis, integration, and revision, knowledge encompasses dynamic combinations of previous experiences, expertise, unique tactics, values, and understanding of the surroundings (Nonaka & Konno 1998). Based on

knowledge sharing at the individual level, knowledge exchange at the organizational level further emerges (Nonaka & Takaushi 1995). In sum, as a social interaction, knowledge sharing is a valuable organizational resource that significantly influences organizational effectiveness and competitiveness.

# 2.3 Punctuated Equilibrium Theory (PET)

Eldredge and Gould (1972) first proposed their punctuated equilibrium model. Their observations of the stratum of an ancient fossil revealed that the emergence of new species involves simultaneously a stable yet extremely fast revolution. In contrast with Darwin's classical revolution, this model stresses that the emergence of new species does not necessarily require an enormous amount of time for species to evolve.

Eldredge and Gould's (1972) posited that species do not passively react to environmental changes, but adapt surrounding environments actively. Even under environmental changes, species do not necessarily respond to gradual revolution. This argument largely differs from Darwin's perspective in this respect. Additionally, Eldredge and Gould asserted that new species emergence in a relatively short period; differentiations of species are faster than classical revolutionists expected.

By applying this model to the team and organization literature, we hypothesize that complex team dynamics can be interpreted using the punctuated equilibrium model. Restated, team development also consists of long term stability and short term, drastic changes. Teams often face relatively stable environments and gradually develop. However, when radical changes occur, teams encounter an accidental and fast revolution, making teams periodically unstable. From this perspective, team members must actively prepare for the "big change" during the equilibrium stage (Thurow 1997).

# 2.4 Agency theory

Since the 1960s, economists have focused on risk sharing among individuals and groups by asserting that when cooperating partners differ in their preferences to risk, risk sharing most likely occurs. Specifically, when cooperating partners lack an identical goal, goal conflicts with each other and the agency problem tends to occur (Jensen & Meckling 1976). Pfeffer (1997) hypothesized that, without adequate incentives, individuals naturally prefer self-interests to the benefits of others. One part (the "client") that instructs the other (the "agent") to achieve certain tasks would have to pay considerable agency costs to monitor whether its partner is concerned with its profits

and benefits.

Under a condition in which agents acquire additional information and necessary skills than clients, information asymmetry places agents and clients in unequal positions. Agents tend to fulfill their self-interests rather than the common interests of both sides, thus hurting welfare of the clients (Jensen & Meckling 1976). This difference in goals also distinguishes between attitudes toward risks of agents and clients. Agents may take more risks than what clients expect, eventually inhibiting the effectiveness of cooperation. Conversely, agents may be reluctant to take necessary risks, making it impossible to achieve anticipated profits. Therefore, how to prevent the agency problem among team members must be understood because doing so may impede the efficiency of knowledge sharing.

# 3. Hypotheses and Method

#### 3.1 Research Framework

This study examines factors that affect knowledge sharing among team members from a dynamic, developmental perspective, followed by testing of how the agency problem alters the quantity and quality of knowledge sharing. Figure 1 graphically represents the proposed research framework. Whether initial trustworthiness towards other members, early communication level, and early team cohesiveness are related to early trust among team members is investigated first. Exactly how early trust and factors are related is then examined, including late communication level, late cohesiveness, late satisfaction, and more importantly, the quantity/quality of knowledge sharing. Finally, effects of the agency problem are examined by verifying whether goal conflict, opportunism, and information asymmetry are related to the quantity/quality of knowledge sharing.

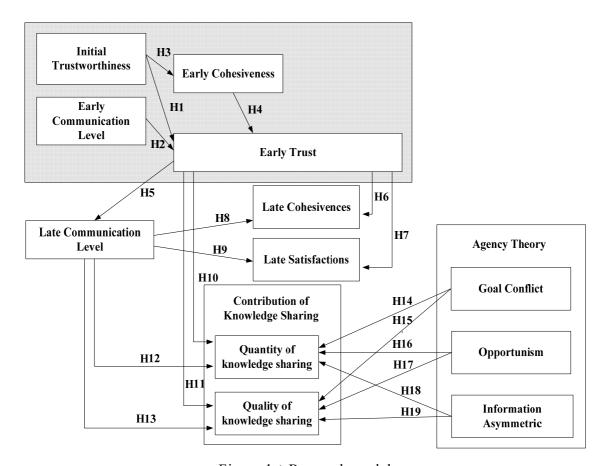


Figure 1: Research model

# 3.2 Hypotheses

#### 3.2.1 Relation between initial trustworthiness and early trust

Trustworthiness is a motivation or a set of motivations for acting. Specifically, when individuals of a group are believed to be trustworthy, trust emerges and became lubricant for the operation of organization within that group (Qin et al. 2011). According to Jarvenpaa et al. (2004), before formally interacting with other team members, the initial trustworthiness of team members emerge from their willingness to trust others. Namely, team members tend to attribute their trust towards others to their trustworthiness. Especially in the formation of a new team, initial trustworthiness profoundly impacts formation of interpersonal trust. We thus hypothesize the following:

H1: Initial trustworthiness of team members is positively related to their early trust towards others.

#### 3.2.2 Relation between early communication level and early trust

Effective communication initiates the formation of a close relationship and cohesiveness of a team (Sharma & Patterson 1999). When capable of communicating with each other smoothly, team members further ensure that team members highly trust each other. Especially in the face-to-face condition, team members are sensitive to all observed interactions that enhance the trustworthy environment (Meyerson et al. 1996). Effective communication thus suggests that "other members are truly with me" (Jarvenpaa & Leander 1998); it can develop mutual loyalty, a close friendship, and a common vision, all of which significantly facilitate the formation of trust. We thus hypothesize the following:

H2: Early communication level of team members is positively related to their early trust towards each other.

#### 3.2.3 Relation between initial trustworthiness and early cohesiveness

We also hypothesize that initial trustworthiness influences early cohesiveness of the team. Cohesiveness originates from attracted and motivated team members. When members are similar to others in age, attitudes, needs, and background, cohesiveness is improved and facilitates mutual identification with the collective, ultimately bringing members together to accomplish tasks (Schermerhorn et al. 2008). Initial trustworthiness elicits the sincere concern of members for others and their team as a whole, thus providing an appropriate basis for team cohesiveness. We thus hypothesize the following:

H3: Initial trustworthiness of team members is positively related to team's early cohesiveness.

#### 3.2.4 Relation between early cohesiveness and early trust

The concept of cohesion refers to a condition of solidarity, where the people willing to stay in a relationship to form a united whole. It is also viewed as an important predictor of group behaviors which is argued to affect affinity and trust (Barnard et al. 1993; O'Reilly et al. 1989). By sharing common values and goals, the members of cohesive groups more likely to communication and cooperation with one another. As a result, they should have greater trust and agreement about interaction norms and group processes (Nemeth & Staw 1989).

In addition, Carron (2000) defined team cohesiveness as the dynamic that connects and unites team members together to pursue identical team goals. Forsyth (1983) also defined team cohesiveness as identification of team members with the team, passion to the team's vision, and willingness to help the team to achieve success. Bollen and Hoyle (1990) posited that team cohesiveness signals strong interpersonal attractiveness; trust emerges naturally when team members are attracted to each other. We thus hypothesize the following:

H4: Team early cohesiveness is positively related to early trust.

#### 3.2.5 Relation between early trust and late communication level

Communication exchanges and distributes attitudes, opinions, perspectives dynamically among individuals or groups for specific objectives. Anderson and Narus (1990) mentioned that communication and trust have a reciprocal relationship. Restated, meaningful communication contributes to increased trust, resulting in more frequent and fluent communication. Namely, communication is the prerequisite for better early trust, while elevated trust level assists members to continue enjoying better communication. We thus hypothesize the following:

H5: Early trust is positively related to late communication level.

#### 3.2.6 Relation between early trust and late cohesiveness/satisfaction

According to previous studies, develop a trust-based relationship among members of group is a challenge. It can significantly reduce the transaction cost and increase group cohesion, which has facilitated the activities of collectives (Coleman 1990). Jarvenpaa et al. (2004) have found that trust plays a critical role in the virtual group that affects the relations among group members and between the groups, and has positive influence to group cohesion and satisfaction as well. They also found that trust shows at various stages of group development. Following the transition point of team development, members whom trust others more actively seek their roles and responsibilities in the team, and are more likely to communicate better with others. Accordingly, cohesiveness of team members and their satisfaction with cooperation are further improved. We thus hypothesize the following:

H6: Early trust is positively related to late cohesiveness.

H7: Early trust is positively related to late satisfaction.

# 3.2.7 Relation between late communication level and late cohesiveness/satisfaction

Previous studies show that frequent communication will increase information exchange among group members (Allen 1970; 1977). Moreover, frequent communication is associated with increased group cohesion (Bishop & Levine 1999) because members of a cohesion group will share the information resources better, will process more project related information, and will know more details about the project (Shaw 1981).

In addition, team members with low interpersonal trust do not devote themselves to the team unless others show their commitment explicitly. Such members carefully evaluate the communication process to determine whether others are trustworthy (Jarvenpaa et al. 2004). In contrast, team members that highly trust each other significantly elevate team cohesiveness and satisfaction with cooperation. We thus hypothesize the following:

H8: Late communication level is positively related to late cohesiveness.

H9: Late communication level is positively related to late satisfaction.

#### 3.2.8 Factors affecting knowledge sharing behavior

Knowledge sharing among team members is impossible without interpersonal trust (Davenport & Prusak 1998). Moreover, trust cannot emerge in a relatively short period given that initial trustworthiness is the outcome of a comprehensive evaluation of interpersonal interactions. While consisting of the willingness and the behavior of sharing; knowledge sharing occurs and contributes to a team only when the willingness is transformed into actual behavior. Such a transformation depends on various factors. The hierarchical model of intrinsic and extrinsic motivation states that, knowledge sharing does not occur unless the personal needs of team members can be fulfilled (Vallerand 1997). Thus, effective knowledge sharing refers not only to the ability t elevate the willingness to share knowledge, but also the successful sharing behavior.

Politis (2003) found that interpersonal trust in self-managing team is a significant predictor in facilitating communication or understanding problems. In addition to facilitating high-quality communication, trust increases knowledge sharing as well. Characterized by their trustworthiness, teammates frequently cooperate with each other although they lack sufficient previous interactions. Conversely, a team lacking mutual trust requires that members spend much time and effort in monitor the performances

others and subsequently making them unwilling to share knowledge (Jarvenpaa et al. 2004). Kessler, Bierly and Gopalakrishnan (2000) noted that outcomes of organizational learning cannot be accumulated if team members are reluctant to distribute knowledge to others. They must communicate with each other frequently and fluently to achieve the benefits of knowledge sharing. This study assesses knowledge sharing based on quantity and quality. We thus hypothesize the following:

- H10: Early trust is positively related to quantity of knowledge sharing.
- H11: Early trust is positively related to quality of knowledge sharing.
- H12: Late communication level is positively related to quantity of knowledge sharing.
- H13: Late communication level is positively related to quality of knowledge sharing.

#### 3.2.9 Agency problem and knowledge sharing

By extending the results of Hendriks (1999), this study applies agency theory to explore knowledge sharing literature by treating knowledge providers as clients of the shared knowledge and knowledge receivers as agents. As mentioned above, the agency theory attempts to regulate the client-agent relationship by effective contracts that prevent agency problems (Jensen & Meckling 1976). Those contracts that fail to regulate this relationship create three main problems. These problems are addressed as follows, along with hypotheses made accordingly.

Goal conflict. Agents, i.e. knowledge receivers, whom prefer self-interests to collective interests of both sides tend to maximize their own profits rather than the mutual welfare. Consequently, goal inconsistency occurs. Knowledge sharing is likely to be inhibited when an enormous goal conflict occurs between clients and agents. We thus hypothesize the following:

- H14: Goal conflict is negatively related to the quantity of knowledge sharing.
- H15: Goal conflict is negatively related to the quality of knowledge sharing.

Opportunism. Opportunists often achieve their personal goals by deceiving others. Such behaviors cause suspicion and distrust among clients and agents (Williamson 1975). Clients are often unable to closely monitor their agents. Upon finding out that agents deliberately concealed important information and avoided obligations specified

in the contract, clients are likely to terminate the client-agent relationship (Williamson 1975). Consequently, knowledge sharing would be ineffective. We thus hypothesize the following:

H16: Opportunism is negatively related to the quantity of knowledge sharing.

H17: Opportunism is negatively related to the quality of knowledge sharing.

Information asymmetry. According to Jensen and Meckling (1976), in the case of information asymmetry, clients do not fully understand the characteristics and abilities of agents. Clients are thus unable to evaluate precisely whether all actions made by agents are in the mutual interests of both sides. Similarly, in a knowledge sharing relationship, knowledge providers may not have adequate clues to evaluate the intention of knowledge receivers; providers are prone to a situation in which receivers may take advantage of them. We thus hypothesize the following:

H18: Information asymmetry is negatively related to quantity of knowledge sharing.

H19: Information asymmetry is negatively related to quality of knowledge sharing.

# 3.3 Research Design

This study focuses on the dynamic process of interpersonal trust and knowledge sharing. As designing a cross-sectional study to examine the validity of our hypotheses would be inappropriate, a longitudinal design should be adopted. As March (1991) recommended, in addition to enabling a long term observation of studied subjects, a longitudinal design provides an opportunity to illustrate team dynamics thoroughly.

Therefore, this study performs a field experiment and observes how study participants react at various times. An attempt is thus made to integrate the punctuated equilibrium theory and the agency theory by examining the development of trust and how it affects knowledge sharing among team members. Moreover, the questionnaires used to collect participant responses are designed based on Jarvenpaa et al. (2004) and Becerra-Fernandez and Sabherwal (2001).

A single-blind, randomized controlled trial was adopted in this study. Randomized controlled trial is one of the simplest but most powerful tools of research (Stolberg et al. 2004). It is a study in which people randomly assign eligible subjects or other units of

study (e.g. classrooms, playgrounds) into groups to receive or not receive one of several interventions that are being compared. The results are analyzed by comparing outcomes in the groups.

Study participants were from two undergraduate freshman classes in a southern Taiwan university. Each class consisted of several project teams, each comprising five to eight team members. In the first class (class A), no treatment was used to affect the development process of each team. Teams in class A were thus under a weak structure of trust. In the other class (class B), a series of socialization treatments was performed to evoke frequent initial communications and interactions. Teams in class B were also instructed to regularly recall previous inter-member interaction experiences and repeatedly discuss their projects. Hence, teams in class B were under a strong structure of trust, as manifested by a clear awareness of team goals and strong identification with the team. Throughout the experiment the same researcher was assigned to both groups for avoidance of bias and ensures validity. Moreover, the participants did not know to which group they have been assigned.

In three different time intervals (i.e. beginning of the fall semester in September, 2008, deadline of mid-term report submission, and end of the winter semester in January, 2009), surveys were distributed to each participant in both classes to evaluate their team performance. Our hypotheses were tested by examining data collected from these surveys. Forty two (37) sets of effective surveys were received from class A (B), representing a 100% response rate. A proposed data collection schedule is shown in Table1. Two of the questionnaire surveys were omitted owing to incomplete data. Seventy seven sets were used in the final analyses.

Implemen-Implemen-Implemen-Number of Class Groups Class time tation tation tation Students Date 1 Date 2 Date 3 Α 14:30-7 2008/09/30 | 2008/11/18 | 2009/01/13 (control 42 16:20 group) В 16:30-7 2008/09/30 | 2008/11/18 | 2009/01/13 (treatment 37 17:20 group)

Table 1: Time frame for data collection efforts

# 4. Data Analysis and Research Results

# 4.1 Analysis of reliability and validity

To achieve research objectives and test the hypotheses, this study adopted descriptive statistic analysis and structural equation modeling to verify the connections of each research variable. Meanwhile, composite reliability (CR) of the dimensions was assessed, and all variables exceeded more than 0.7. Chin (1998) posited that the values of the composite reliability are acceptable when the values exceed 0.7. Simultaneously, the values of average variance extracted (AVE) of variables were determined, and all variables exceeded 0.5. Fornell and Larcker (1981) posited the values of average variance extracted (AVE) are more likely valid when the values exceed 0.5. Table 2 and Table 3 list the values of construct reliability and the average variance extracted from the variables.

Based on content validity, the questionnaires were ameliorated by interviewing professors from relevant fields.

Table 2: Construct reliability and average variance extracted of the variables – class A

Constructs	CR	AVE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Initial trustworthiness (IT)	0.90	0.69	0.83											
(2) Early communication level (ECL)	0.93	0.68	0.60	0.82										
(3) Early cohesiveness (EC)	0.92	0.75	0.74	0.42	0.87									
(4) Early trust (ET)	0.89	0.57	0.63	0.60	0.47	0.69								
(5) Late communication level (LCL)	0.92	0.64	0.13	0.28	-0.05	0.54	0.80							
(6) Late cohesiveness (LC)	0.90	0.70	0.23	0.29	0.07	0.59	0.75	0.84						
(7) Late satisfaction (LS)	0.88	0.65	0.24	0.25	0.09	0.61	0.72	0.63	0.81					
(8) Goal conflict (GC)	0.93	0.78	-0.07	-0.03	-0.04	-0.32	-0.47	-0.44	-0.35	0.88				
(9) Opportunism (OP)	0.95	0.85	0.03	0.05	0.07	-0.30	-0.40	-0.31	-0.42	0.58	0.92			
(10) Information asymmetry (IA)	0.89	0.73	-0.10	-0.11	-0.04	-0.33	-0.56	-0.47	-0.41	0.61	0.63	0.85		
(11) Quantity of knowledge sharing (QT)	0.86	0.58	0.05	0.01	0.01	0.28	0.56	0.49	0.39	-0.63	-0.61	-0.75	0.76	
(12) Quantity of knowledge sharing (QL)	0.91	0.60	0.04	0.06	-0.02	0.39	0.64	0.52	0.57	-0.66	-0.64	-0.65	0.62	0.77

Note: CR-composite reliability; AVE-average variance extracted. The diagonal elements in bold (the square root of average variance extracted—AVE) should exceed the inter-construct correlations below and across them for adequate discriminate validity.

CR AVE (1) Constructs (2) (3) (4) (5) (10)(1) Initial trustworthiness (IT) 0.84 0.91 0.71(2) Early communication level (ECL) 0.91 0.62 0.55 0.79

Table 3: Construct reliability and average variance extracted of the variables – class B

0.91 (3) Early cohesiveness (EC) 0.71 0.80 0.84 0.65 (4) Early trust (ET) 0.93 0.58 0.75 0.75 0.81 0.85 0.94 0.74 0.72 0.63 0.80 0.86 (5) Late communication level (LCL) 0.66 (6) Late cohesiveness (LC) 0.62 0.62 0.58 0.62 0.78 0.79 0.79 (7) Late satisfaction (LS) 0.880.66 0.59 -0.67 0.650.81 0.680.67 0.81 (8) Goal conflict (GC) 0.98 0.91 -0.60 -0.73 -0.72 -0.80 -0.67 -0.76 -0.72 **0.96** 0.97 0.91 -0.52 -0.60 -0.70 -0.61 -0.64 0.95 (9) Opportunism (OP) -0.59 -0.64 0.68 0.88 -0.59 -0.65 -0.71 (10) Information asymmetry (IA) 0.96 -0.64-0.77-0.72-0.65 0.75 0.94 0.60 0.65 0.70 0.740.79 0.65 0.68 -0.82 | -0.70 -0.68 **0.78** (11) Quantity of knowledge sharing (QT) 0.86 0.72 0.92 0.61 0.65 0.65 0.69 0.80 0.78 0.74 0.67 | -0.79 | -0.67 | -0.85 | 0.66 | **0.78** (12) Quantity of knowledge sharing (QL)

Note: CR-composite reliability; AVE-average variance extracted. The diagonal elements in bold (the square root of average variance extracted-AVE) should exceed the inter-construct correlations below and across them for adequate discriminate validity.

#### 4.2 Structural Model

Based on structural equation modeling (SEM), the hypotheses were validated by applying Smart-PLS 2.0 software (Ringle et al. 2005). Meanwhile, an evaluation was made of the significances with T value, explanations of variance, path coefficient analysis of potential variance and relevant influence of potential variance.

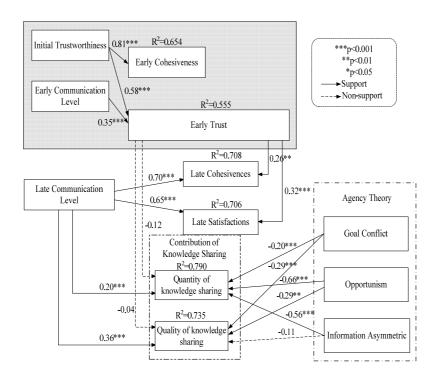
Appraisals of structural model included in this article also included analyzing the significances of path coefficient and the explanation of model (R<sup>2</sup>). R<sup>2</sup> value shows goodness-of-fit of the model, depending on the parameters. Table 4 summarizes those results, as depicted in class A (Table 4, Fig 2) and class B (Table 4, Fig 3).

Deal	Class	s A	Class B		
Path	Path coefficient	T value	Path coefficient	T value	
Initial trustworthiness → Early trust	0.58	8.33***	0.61	9.74***	
Initial trustworthiness → Early cohesiveness	0.81	24.08***	0.90	96.21***	
Early communication level → Early trust	0.35	4.48***	0.40	6.00***	
Early trust → Late cohesiveness	0.26	2.81**	0.46	5.33***	
Early trust → Late satisfaction	0.32	3.68***	0.88	9.07***	
Early trust → Quantity of knowledge sharing	-0.12	1.92	0.51	6.57***	
Early trust → Quality of knowledge sharing	-0.04	0.11	0.23	2.54**	
Late communication level → Late cohesiveness	0.70	9.06***	0.47	5.47***	
Late communication level → Late satisfaction	0.65	9.15***	-0.02	0.21	
Late communication level → Quantity of knowledge sharing	0.20	2.96**	-0.11	0.81	
Late communication level → Quality of knowledge sharing	0.36	4.6***	0.37	3.86***	
Goal conflict → Quantity of knowledge sharing	-0.20	3.81***	-0.59	8.85***	
Goal conflict → Quality of knowledge sharing	-0.29	4.4***	-0.28	2.06**	
Opportunism → Quantity of knowledge sharing	-0.66	5.45***	-0.31	3.10***	
Opportunism → Quality of knowledge sharing	-0.29	3.20**	-0.03	0.29	
Information asymmetry → quantity of knowledge sharing	-0.56	7.9***	-0.75	6.79***	
Information asymmetry → quality of knowledge sharing	-0.11	1.07	-0.56	9.25***	

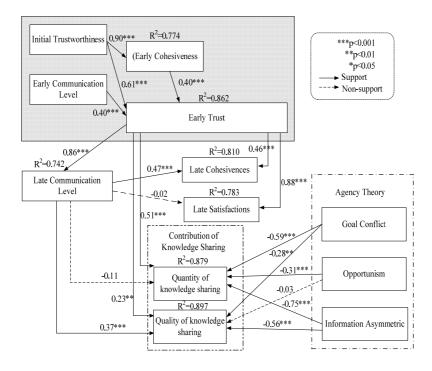
Table 4: The results of path coefficient analysis

Figure 2 summarizes the results of the structural model of class A. Fourteen hypotheses reach significance in 17 hypotheses, including initial trustworthiness—early trust ( $\beta$ =0.58), initial trustworthiness—early cohesiveness ( $\beta$ =0.81), early communication level—early trust ( $\beta$ =0.35), early trust—late cohesiveness ( $\beta$ =0.26), Early trust—late satisfaction ( $\beta$ =0.32), Late communication level—late cohesiveness ( $\beta$ =0.70), Late communication level—late satisfaction ( $\beta$ =0.65), Late communication level—quantity of knowledge sharing ( $\beta$ =0.20), Goal conflict—quantity of knowledge sharing ( $\beta$ =-0.20), Goal conflict—quality of knowledge sharing ( $\beta$ =-0.29), Opportunism—quantity of knowledge sharing ( $\beta$ =-0.29), and Information asymmetry—quantity of knowledge sharing ( $\beta$ =-0.56).

Figure 3 displays the results that validate the structural model of class B. Fourteen hypotheses reach significance in 17 hypotheses, including initial trustworthiness—early trust ( $\beta$ =0.61), initial trustworthiness—early cohesiveness ( $\beta$ =0.90), early communication level—early trust ( $\beta$ =0.35), early trust—late cohesiveness ( $\beta$ =0.46), Early trust—late satisfaction ( $\beta$ =0.88),



 $Figure \ 2 \ : \ Path \ analysis \ results - Class \ A$ 



 $Figure \ 3 \ : \ Path \ analysis \ results - Class \ B$ 

Early trust—quantity of knowledge sharing ( $\beta$ =0.51), Early trust—quality of knowledge sharing ( $\beta$ =0.23), Late communication level—late cohesiveness ( $\beta$ =0.47), Late communication level—quality of knowledge sharing ( $\beta$ =0.37), Goal conflict—quantity of knowledge sharing ( $\beta$ =-0.59), Goal conflict—quality of knowledge sharing ( $\beta$ =-0.28), Opportunism—quantity of knowledge sharing ( $\beta$ =-0.31), Information asymmetry—quantity of knowledge sharing ( $\beta$ =-0.75), and Information asymmetry—quality of knowledge sharing ( $\beta$ =-0.56).

Additionally, based on verification of the explanation of model (R<sup>2</sup>), six dependent variables include early cohesiveness, early trust, late cohesiveness, late satisfaction, quantity of knowledge sharing and quality of knowledge sharing reach to 0.654, 0.555, 0.708, 0.706, 0.790 and 0.735 in class A and 0.774, 0.835, 0.810, 0.783, 0.879 and 0.897 in class B separately. According to those results, six variables can explain the intensity of six dependent variables in this study.

#### 5. Discussion

This study examined the dynamic process of trust development, different (i.e. weak and strong) trust structures, agency problems, and the effects of these factors on knowledge sharing in student project teams. Longitudinal design was adopted to test our hypotheses. According to those results, different levels of trust and agency problems significantly impact both the quantity and quality of knowledge sharing.

#### 5.1 Processes before the Transition Point

#### 5.1.1 Initial trustworthiness and early trust among team members

In both class A and class B, initial trustworthiness was positively related to early trust. This association was especially strong in class B. Although this finding is consistent with that of Jarvenpaa et al. (2004), the trust worthiness, i.e. trust link rather than virtual teams, was validated. While some of the manipulation of Jarvenpaa et al. (2004) failed to affect early trust levels, the trust structure in class B was successfully altered. Our results suggest that during the formation of a new team, initial trust worthiness plays an important role in ensuring a psychologically safe context that subsequently increases early trust.

5.1.2 Early communication level and early trust among team members
In both class A and class B, the early communication level was positively related to

early trust. As expected, this association was stronger in class B than in class A. Moore et al. (1987) suggested that communication significantly elevates interpersonal trust. Our results indicate that frequent communications among members is vital to create and maintain high levels of interpersonal trust. Its effect is particularly significant in the uncertain early team-building stage. Similar to initial trustworthiness, early communication level also provides a psychologically safe context as the basis of early trust.

#### 5.1.3 Initial trustworthiness and early cohesiveness among team members

In both class A and class B, initial trustworthiness was positively related to early team cohesiveness. Again, this association was stronger in class B than in class A. Shaw (1980) indicated that members whom value team interests above their self-interests are more likely to engage in team activities; in addition, the team would be more cohesive as well. Consistent with this argument, our results indicate that initial trustworthiness enhances mutual care, respect, and attractiveness, making members more willing to share their opinions on their projects. Consequently, team cohesiveness gradually emerges.

#### 5.2 Processes after the Transition Point

In both class A and class B, early trust was positively related to early late cohesiveness. This finding is consistent with that of Jarvenpaa et al. (2004), suggesting that after a certain number of interactions, trust among members significantly increased. Participants became more cohesive, with their discussion of and preparation for their final report revealing considerable value similarity among team members at the end of the semester.

In contrast with late cohesiveness, in both class A and class B, early trust was positively related to the early late satisfaction. However, this relationship was stronger in class B than in class A. This finding is consistent with that of Jarvenpaa et al. (2004), suggesting that early trust promotes a positive, encouraging environment that creates high satisfaction with cooperation.

# 5.2.1 Late communication level and late cohesiveness/satisfaction among team members

While in both class A and class B, late communication level was positively related to early late cohesiveness; this relationship was stronger in class A than in class B.

Following the transition point, team members became more familiar with each other. Also, the preparation for the final report increased the interaction frequency of team members, ultimately allowing frequent and fluent communication to further solidify team cohesiveness.

Regarding late satisfaction, late communication level and late satisfaction were positively related. According to Jarvenpaa et al. (2004), members whom are under a low early-trust condition were more likely to evaluate their teams based on how members communicate with each other. Accordingly, the association between communication level and satisfaction with cooperation was particularly strong. Consistent with this finding, our results indicated a strong late communication level – late satisfaction link in class A. Conversely, this relationship in class B was not identified. This finding again supports the finding of Jarvenpaa et al. (2004).

#### 5.2.2 Early trust and knowledge sharing among team members

In class A, early trust and quantity of knowledge sharing were not significantly related. Our results were consistent with the results of Dirks and Ferrin (2002), which posited that under a weak trust structure, trust is unrelated to knowledge sharing. Conversely, in class B, early trust predicted quantity of knowledge sharing. This finding suggests that as Quigley et al. (2007) concluded, under a strong trust structure, high early trust influences the quantity of knowledge sharing.

Similarly, in class A, early trust and quality of knowledge sharing were not significantly related. However, early trust was positively related to the quality of knowledge sharing. This finding suggests that under a strong trust structure, high levels of early trust enhance the quality of knowledge sharing. O'Reilly (1978) found that mutual trust among team members increased the quality, i.e. reliability, preciseness, and timeliness, of information exchange. Consistent with the results of this early study, this study found a significant relation between trust and quality of knowledge sharing.

As Jarvenpaa et al. (2004) indicated, under a weak trust structure, trust cannot predict late communication and team performance. Namely the inability to establish early trust makes it impossible for trust to promote knowledge sharing. Although considered capable of lowering interpersonal uncertainty, trust does not universally influence knowledge sharing.

#### 5.2.3 Late communication level and knowledge sharing among team members

Cabrera and Angel (2005) found that communication is a core competence of knowledge management in organizations that directly affects knowledge sharing. In

class A, our results indicated that late communication level significantly predicted quantity of knowledge sharing. In contrast class B did not contain this relationship. Based on the findings of Jarvenpaa et al. (2004), we speculate that trust and communication levels complement each other; high levels of trust create lower levels of communication and interaction frequency. Although this complementary relationship appears to be acceptable, our results regarding knowledge sharing in class B indicate that lower levels of communication resulting from high levels of trust still decrease the effectiveness of knowledge sharing. This may represent an unexpected cost of interpersonal trust.

As for the quality of knowledge sharing, in both classes A and B, the late communication level was positively related to the quality of knowledge sharing. During the end of the semester and subsequently under the pressure of the final report, frequent and fluent communication significant enhances the quality of knowledge sharing.

#### 5.2.4 Agency problems and knowledge sharing among team members

Goal conflict. Our results indicate that in classes A and B, goal conflicts were negatively related to knowledge sharing. This finding suggests that goal conflicts among team members should be controlled and lowered to a minimum level to increase the effectiveness of knowledge sharing. We recommend that team leaders articulate a collective vision and create a psychologically safe environment to facilitate knowledge sharing.

Opportunism. Our results indicate that in class A, opportunism negatively predicted quantity of knowledge sharing. However, this relationship was not found in class B. We thus postulate that this unexpected result may originate from our sampling strategy. As student project teams are investigated where all members share the same outcome, opportunism may only negligibly affect individual decision making. Members may tend to share as much knowledge as possible to maximize the common interests of the team.

Whereas opportunism did not predict the quantity of knowledge sharing, it was positively related to the quality of knowledge sharing in both classes. According to Wang (2004), members with strong ethical values tend to consider knowledge sharing an obligation and thus share more knowledge with teammates. However, members whom feel threatened by keen competition are likely to decrease knowledge sharing behavior and retain valuable information. To prevent this unfavorable outcome, organizations should minimize opportunism by appropriately implementing a reward

and incentive systems to maximize mutual interests among team members.

Information Asymmetry. In both classes, information asymmetry negatively predicted the quantity of knowledge sharing. Consistent with the findings of Festinger (1954), which asserted that individuals tend to eliminate unpleasant feelings aroused by social comparison and inconsistency between expectation and reality, our results indicate that team members whom considered the opinions of teammates acquire more information and resources. Moreover, they are likely to diminish knowledge sharing in order to decrease unfair perceptions.

In class A, our results indicated that information asymmetry is unrelated to quality of knowledge sharing. In contrast, information asymmetry and quality of knowledge sharing in class B were significantly related. Above results suggest that knowledge providers should first evaluate knowledge receivers' ability and goodwill to utilize the shared knowledge to create mutual benefits. Importantly, the quality of knowledge sharing decreases if this evaluation is unavailable owing to information asymmetry.

According the above, this research model which is integrated punctuated equilibrium theory and agency theory might provide a better explanation for knowledge sharing within group in real settings than the models relied on a single perspective. Through the experiment (e.g. socialization), in addition, the results showed that the members had highly early trust to one another member when they in a strong structure. Unlike the study results of Jarvenpaa et al. (2004), we found that face-to-face interaction resulted in more trust relationship than in virtual group, because of high trust would minimize negatives (e.g. uncertainty, incomplete information). In short, people who come from different backgrounds in a trust-based environment tend to more trustworthy and willing to share the knowledge they have, and eventually may increase the quantity and quality of knowledge shared in organization.

This result has important managerial implications. The relationship that proved to exist between trust, communication, goal conflict, opportunism, and information asymmetric indicates the importance of such factors as prerequisites for the knowledge sharing behavior within an organization. Moreover, the ways of these factors influencing knowledge sharing behavior also depend upon the situation and conditions present. In a weak structure, managers may attempt to change the level of trust, such as reinforcing trust between coworkers through arranging social events occasionally. Increased in trust are likely to have a direct, positive impact on a team member's attitudes and perceived outcomes. If trust is too high, however, communication may

negatively impact attitudes and outcomes because people feel they do not need to engage in these events. Hence, in order to improve the quantity and quality of knowledge sharing, management needs to balance the levels of trust and the degree of structure within an organization.

One limitation of our research was the use of student subjects, which could potentially limit the generalization of our findings. However, we were controlling this limitation by selecting a task that did not require knowledge of a specific subject matter and students appeared familiar with other participants before their tasks. Additionally, the number of samples for questionnaire survey was small may limit reliability of results. However, we used multiple tests to assess assumptions of normality and avoid other biases that might result from small samples problem. Future studies should choose different groups of subjects or use different research methods to verify our results.

Finally, our research model was based on punctuated equilibrium theory and agency theory to evaluate the behaviors of knowledge sharing within the groups. However, there are other factors and theory such as social capital, transaction costs, or social exchange, etc. that have shown to influence the behavior of sharing knowledge. Future research could build on this research by using other theoretical perspectives to investigating knowledge sharing behaviors. In conclusion, despite the potential limitations this research makes some important contributions to both research and practice.

#### References

- Allen, T.J. (1970), 'Communication networks in R&D laboratories', *R&D Management*, Vol. 1, No. 1, pp. 14-21.
- Allen, T.J. (1977), *Managing the Flow of Technology*, Harvard University Press, Cambridge, Massachusetts.
- Anderson, J.C. and Narus, J.A. (1990), 'A model of distributor firm and manufacturer firm working partnerships', *Journal of Marketing*, Vol. 54, No. 1, pp. 42-58.
- Barnard, W.A., Baird, C., Greenwalt, M. and Karl, R. (1993), 'Intragroup cohesiveness and reciprocal social influence in male and female discussion groups', *Journal of Social Psychology*, Vol. 132, No. 2, pp. 179-188.
- Barney, J.B. (1991), 'Firm resources and sustained competitive advantage', *Journal of Management Studies*, Vol. 17, No. 1, pp. 99-120.
- Becerra-Fernandez, I. and Savherwal, R. (2001), 'Organizational knowledge

- management: a contingency perspective', *Journal of Management Information Systems*, Vol. 18, No. 1, pp. 23-55.
- Bishop, L. and Levine, D.I. (1999), 'Computer-mediated communication as employee voice: a case study', *Industrial Labor Relations Review*, Vol. 52, No. 2, pp. 213-233.
- Bollen, K.A. and Hoyle, R.H. (1990), 'Perceived cohesion: a conceptual and empirical examination', *Social Forces*, Vol. 69, No. 2, pp. 479-504.
- Butler, J.K. (1991), 'Toward understanding and measuring conditions of trust: evolution of conditions of trust inventory, *Journal of Management Information Systems*, Vol. 17, No. 3, pp. 643-663.
- Cabrera, E.F. and Angel, C. (2005), 'Fostering knowledge sharing through people management practices', *International Journal of Human Resource Management*, Vol. 16, No. 5, pp. 720-735.
- Carron, A.V. (2000), 'Cohesiveness in sport group: interpretation and considerations', *Journal of Sport Psychology*, Vol. 4, pp. 123-138.
- Chin, W.W. (1998), 'The partial least squares approach to structural equation modeling', in Marcoulides, G.A. (Eds.), *Modern Methods for Business Research*, Hillsdale, Lawrence Erlbaum Associates, NJ, pp. 295-336.
- Cohen, W.M. and Levinthal, D.A. (1990), 'Absorptive capacity: a new perspective on learning and innovation', *Administrative Science Quarterly*, Vol. 35, No. 1, pp. 128-152.
- Coleman, J.S. (1990), Foundations of Social Theory, Harvard University Press, Cambridge, Massachusetts.
- Davenport, T.H. and Prusak, L. (1998), *Working Knowledge: How Organizations Manage What They Know*, Harvard Business School Press, Cambridge, Massachusetts.
- Dirks, K.T. and Ferrin, D.L. (2002), 'Trust in leadership: meta-analytic findings and implications for research and practice', *Journal of Applied Psychology*, Vol. 87, No. 4, pp. 611-628.
- Doney, P.M. and Cannon, J.P. (1997), 'An examination of the nature of trust in buyer-seller relationships', *Journal of Marketing*, Vol. 61, No. 2, pp. 35-51.
- Eldredge, N. and Gould, S. (1972), 'Punctuated equilibria: an alternative to phyletic gradualism', in Schopf, T.J. (Eds.), *Models in Paleobilogy*, Freeman, Cooper & Co., San Francisio, pp. 82-115.
- Festinger, L. (1954), 'A theory of social comparison processes', *Human Relations*, Vol.

- 7, No. 2, pp. 117-140.
- Foos, T., Schum, G. and Rothenberg, S. (2006), 'Tacit knowledge transfer and the knowledge disconnect', *Journal of Knowledge Management*, Vol. 10, No. 1, pp. 6-18.
- Fornell, C. and Larcker, D.F. (1981), 'Structural equation models with unobservable variables and measurement error', *Journal of Marketing Research*, Vol. 18, No. 1, pp. 39-50.
- Forsyth, D.R. (1983), *An Introduction to Group Dynamics*, Brooks/Cole, Pacific Grove, California.
- Gilbert, T.A. and Tang, T.L.P. (1998), 'An examination of organizational trust antecedents', *Public Personnel Management*, Vol. 27, No. 3, pp. 321-325.
- Gottschalk, P. (2000), 'Knowledge, management in the professions: the case of IT support in law firms', *Proceedings of the 33rd Hawaii International Conference on System Sciences*, Maui, Hawaii, January 4-7, pp. 945-954.
- Hendriks, M. (1999), 'Xerox shares its knowledge', *Management Review*, Vol. 88, No. 8, pp. 40-45.
- Holste, J.S. and Fields, D. (2010), 'Trust and tacit knowledge sharing and use', *Journal of Knowledge Management*, Vol. 14, No. 1, pp. 128-140.
- Jarvenpaa, S.L. and Leander, D.E. (1998), 'Is anybody out there? Antecedent of trust in global virtual teams', *Journal of Management Information Systems*, Vol. 14, No. 4, pp. 29-64.
- Jarvenpaa, S.L., Shaw, T.R. and Staples, D.S. (2004), 'Toward contextualized theories of trust: the role of trust in global virtual teams', *Information Systems Research*, Vol. 15, No. 3, pp. 250-267.
- Jensen, M.C. and Meckling, W.H. (1976), 'Theory of the firm: managerial behavior, agency costs and ownership structure', *Journal of Financial Economics*, Vol. 3, No. 4, pp. 305-360.
- Kessler, E.H., Bierly, P.E. and Gopalakrishnan, S. (2000), 'Internal vs. external learning in new product development: effects on speed, costs and competitive advantage', *R&D Management*, Vol. 30, No. 3, pp. 213-223.
- Lucas, L.M. (2005), 'The impact of trust and reputation on the transfer of best practices', *Journal of Knowledge Management*, Vol. 9, No. 4, pp. 87-101.
- Luhmann, N. (1979), Trust and Power, John Wiley & Sons, Chichester, NY.
- March, J.G. (1991), 'Exploration and exploitation in organizational learning', *Organization Science*, Vol. 2, No. 1, pp. 71-87.

- Mayer, R.C., Davis, J.H. and Schoorman, F.D. (1995), 'An integration model of organizational trust', *The Academy of Management Review*, Vol. 20, No. 3, pp. 709-734.
- Meyerson, D., Weick, K. and Kramer, R. (1996), 'Swift trust and temporary groups', in Kramer, R.M. and Tyler, T.R. (Eds.), *Trust in organizations: Frontiers of theory and research*, Sage, Thousand Oaks, CA, pp. 166-195.
- Moore, S.F., Shaffer, L.S., Pollak, E.L. and Taylor-Lemcke, P. (1987), 'The effects of interpersonal trust and prior commons problems experience on commons management', *Journal of Social Psychology*, Vol. 127, No. 1, pp. 18-29.
- Nahapiet, J. and Ghoshal, S. (1998), 'Social capital, intellectual capital, and the organizational advantage', *Academy of Management Review*, Vol. 23, pp. 242-266.
- Nemeth, C.J. and Staw, B.M. (1989), 'The tradeoffs of social control in groups and organizations', *Advances in Experimental Social Psychology*, Vol. 22, pp. 175-210.
- Nonaka, I. and Konno, N. (1998), 'The concept of "Ba": building a foundation for knowledge creation', *California Management Review*, Vol. 40, No. 3, pp. 40-54.
- Nonaka, I. and Takaushi, H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, NY.
- O'Reilly, C.A. (1978), 'The intentional distortion of information in organizational communication: a laboratory and field investigation', *Human Relations*, Vol. 31, No. 2, pp. 173-193.
- O'Reilly, C.A., Caldwell, D.F. and Barnett, W.P. (1989), 'Work group demography, social integration, and turnover', *Administrative Science Quarterly*, Vol. 34, No. 1, pp. 21-37.
- Pfeffer, J. (1997), New Directions for Organization Theory: Problem and Prospects, Oxford University Press, NY.
- Politis, J.D. (2003), 'The connection between trust and knowledge management: what are its implications for team performance', *Journal of Knowledge Management*, Vol. 7, No. 5, pp. 55-66.
- Qin, X., Shen, J. and Meng, X. (2011), 'Group-based trust, trustworthiness and voluntary cooperation: evidence from experimental and survey data in China', *Journal of Socio-Economics*, Vol. 40, No. 4, pp. 356-363.
- Quigley, N., Tesluk, P., Locke, E. and Bartol, K. (2007), 'A multilevel investigation of the motivational mechanisms underlying knowledge sharing and performance', *Organization Science*, Vol. 18, No. 1, pp. 71-88.
- Ringle, C.M., Wende, S. and Will, A. (2005), 'SmartPLS-Version 2.0', Germany:

- *University at Hamburg*, available at http://www.smartpls.de (accessed 18 April 2011).
- Ryu, S., Ho, S.H. and Han, I. (2003), 'Knowledge sharing behavior of physicians in hospitals', *Expert Systems with Applications*, Vol. 25, No. 1, pp. 113-122.
- Schermerhorn, J.R., Hunt, J.G. and Osborn, R.N. (2008), *Organizational Behavior* (10<sup>th</sup> ed.), John Wiley & Sons, NY.
- Serva, M.A. and Fuller, M.A. (2004), 'The effects of trustworthiness perceptions on the formation of initial trust: implications for MIS student teams', *Journal of Information Systems Education*, Vol. 15, No. 4, pp. 383-395.
- Sharma, N. and Patterson, P.G. (1999), 'The impact of communication effectiveness and service quality on relationship commitment in consumer, professional services', *The Journal of Services Marketing*, Vol. 13, No. 2, pp. 151-170.
- Shaw, J.B. (1980), 'An Information-Processing approach to the study of job design', *The Academy of Management Review*, Vol. 5, No. 1, pp. 41-48.
- Shaw, M.E. (1981), Group Dynamics (3<sup>rd</sup> ed.), McGraw-Hill, NY.
- Stolberg, H.O., Norman, G. and Trop, I. (2004), 'Randomized controlled trials', *American Journal of Roentgenology*, Vol. 183, No. 6, pp. 1539-1544.
- Teece, D.J. (1998), 'Capturing value from knowledge assets: the new economy, markets for Know-How, and intangible assets', *California Management Review*, Vol. 40, No. 3, pp. 55-79.
- Thurow, L.C. (1997), The Future of Capitalism: How Today's Economic Forces Shape Tomorrow's World, Penguin Group, NY
- Tsai, W. and Ghoshal, S. (1998), 'Social capital and value: the role of intrafirm networks', *Academy of Management Journal*, Vol. 41, No. 4, pp. 464-76.
- Tullberg, J. (2008), 'Trust-the importance of trustfulness versus trustworthiness', *The Journal of Socio-Economics*, Vol. 37, No. 5, pp. 2059-2071.
- Vallerand, R.J. (1997), 'Toward a hierarchical model of intrinsic and extrinsic motivation', in Zanna, M.P. (Eds.), *Advances in experimental social psychology*, Academic Press, NY, pp. 271-360.
- Wang, C.C. (2004), 'The influence of ethical and self-interest concerns on knowledge sharing intentions among managers: an empirical study', *International Journal of Management*, Vol. 21, No. 3, pp. 370-381.
- Williamson, O.E. (1975), Markets and Hierarchies: Analysis and Antitrust Implications, Free Press, NY.

# **Appendix: Experimental Instructions**

# 1st socialized manipulation:

In order to increase the understandings to other members of group, each student should answer the questions alone. Mail it to other members of group and teacher assistant. The questions are as follow, (1) introduce yourself; (2) specialty; (3) what to expect from this class; (4) how capabilities or techniques you have will help you write an excellent final report; (5) what problems might be encountered during the cooperation and what might be needed to fix them.

# 2nd socialized manipulation:

Review and discuss the following questions with the members you cooperate. When it happened, how you coped. Explain your experience in details. The questions are as follow, (1) members need to take part in the discussion; (2) it is important to listen to others and respect the job they have been assigned; (3) the conflicts among group members may result in a good outcome for the report; (4) members are not afraid to voice opinions; (5) members of my group get on well with each other; (6) expected results; (7) members of my group help each other; (8) all members should be responsible for the report.