doi:10.1111/isj.12000

Examining interpersonal trust as a facilitator and uncertainty as an inhibitor of intra-organisational knowledge sharing

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Abstract. *This study developed a theoretical model to explore the antecedents of interpersonal trust and the impact of interpersonal trust and uncertainty on intra-organisational knowledge sharing in highly information-technology-mediated work environments. The proposed model was tested empirically using survey data collected from five telecommunication companies. The findings reveal that interpersonal trust has a positive effect on knowledge sharing, while uncertainty has a negative effect upon knowledge sharing. The results also show that social interaction ties and shared knowledge-sharing vision are the antecedent factors of interpersonal trust, and that uncertainty regarding knowledge sharing is increased by seeker absorptive capability concerns, reciprocity concerns and fear of losing knowledge power. Some important implications for theory and practice as well as directions for future study are discussed.*

Keywords: knowledge sharing, social capital theory, transaction cost economics, trust, uncertainty, knowledge management

1. INTRODUCTION

Knowledge sharing has become critical for organisations since it can enable them to strengthen innovation ability, raise performance and sustain competitive advantage (Tsai, 2001; Renzl, 2008). Recognising the importance of knowledge sharing, many organisations implement knowledge management systems and other information technologies (IT) to support person-to-person communication and knowledge sharing (Taylor, 2004; Kankanhalli *et al*., 2005). However, employees may not always be motivated to share their knowledge with others in practice (Bock *et al*., 2005; Kankanhalli *et al*., 2005; Staples & Webster, 2008). One core question for researchers and practitioners is to understand the factors that

can facilitate or inhibit intra-organisational knowledge sharing in highly IT-mediated work environments.

Many researchers state that interpersonal trust, a key aspect of relationship capital, is important because it can strengthen organisational network density and thus lead to higher levels of knowledge sharing (Jarvenpaa *et al*., 1998; Nahapiet & Ghoshal, 1998; McEvily *et al*., 2003; Renzl, 2008). Prior studies have identified the importance of interpersonal trust in shaping intra-organisational knowledge sharing (e.g. Nahapiet & Ghoshal, 1998; McEvily *et al*., 2003), especially in organisations with knowledge management systems and other IT-based tools (e.g. Huber, 2001; Staples & Webster, 2008). Consequently, interpersonal trust is treated as a knowledge-sharing facilitator in this study.

Some researchers argue that uncertainty causes higher transaction cost and inhibits individual knowledge sharing behaviour (Shin, 2004). Generally, knowledge sharing in organisations is largely a voluntary behaviour with no explicit rule or agreement guaranteeing that knowledge seekers will return the favour (Davenport & Prusak, 1998; Staples & Webster, 2008). In this view, intra-organisational knowledge sharing can be considered as a behaviour involving uncertainty due to the fact contributing knowledge may result in an adverse outcome (Staples & Webster, 2008). Prior research has found that the factors (e.g. loss of knowledge power, lack of expected benefits) leading to an adverse outcome may potentially hinder individuals' willingness to share knowledge in organisations where knowledge management systems have been used (e.g. Huber, 2001; Kankanhalli *et al*., 2005). Based on the above arguments, uncertainty refers to knowledge contributor's perceived uncertainty related to knowledge sharing and is considered as a knowledge-sharing inhibitor in the study.

Trust has been considered as a notable mechanism governing many social exchange relationships which are characterised by uncertainty, vulnerability and dependence (Liang *et al*., 2005; Riegelsberger *et al*., 2005; Pavlou *et al*., 2007). Researchers suggest that trust would not be necessary if actions can be carried out with complete certainty (Rousseau *et al*., 1998), which is congruent with other scholars indicating that trust exerts strong influence on individual behaviour in the situations involving uncertainty (Jarvenpaa *et al*., 2004). As a consequence, trust is believed to be able to reduce the knowledge contributor's perceived uncertainty related to knowledge sharing. In this study, we contend that, in the intra-organisational knowledge sharing context, interpersonal trust helps people overcome uncertainty about knowledge sharing.

While the above studies have shown that interpersonal trust and uncertainty have different impacts on intra-organisational knowledge sharing, few studies have been conducted to examine the antecedents of interpersonal trust and uncertainty in the setting of intra-organisational knowledge sharing. In order to fill the knowledge gap, the study developed a theoretical model to examine various antecedents of trust and the sources of uncertainty. The findings of this study can help us gain a better understanding of how to promote trust and counter uncertainty to facilitate intra-organisational knowledge sharing. The rest of this paper is organised as follows. Section 2 discusses background theory for this research and proposes the hypotheses. Section 3 describes our research design and

analysis results. Then Section 4 interprets our main findings, and Section 5 concludes the paper.

2. THEORETICAL BACKGROUND AND RESEARCH MODEL

Intra-organisational knowledge sharing refers to the movement of knowledge from one member to another within an organisation (Huber, 2001; Staples & Webster, 2008). However, sharing knowledge with others seems difficult (Bock *et al*., 2005). In order to understand the factors affecting knowledge sharing in organisations, we use the social capital theory (SCT), transaction cost economics theory (TCE) and the knowledge sharing literature as the theoretical basis to propose the research model of this study. SCT and TCE are used because the two theories have been used to explain intra-organisation knowledge sharing (e.g. Shin, 2004; Kankanhalli *et al*., 2005). In this model, interpersonal trust is considered a crucial factor influencing intra-organisational knowledge sharing and is associated with social interaction ties and a shared knowledge-sharing vision, according to SCT literature (Tsai & Ghoshal, 1998; Levin & Cross, 2004). Based on TCE and knowledge sharing literature, this study further hypothesises that uncertainty may inhibit knowledge sharing and could be spawned by fear of seeker opportunism, seeker absorptive capability concerns, reciprocity concerns and fear of losing knowledge power. Moreover, based on the suggestion of Riegelsberger *et al*. (2005), we propose that interpersonal trust reduces uncertainty. The research model for this study is shown in Figure 1. The remainder of this section describes the logic and empirical support for each hypothesis in the model.

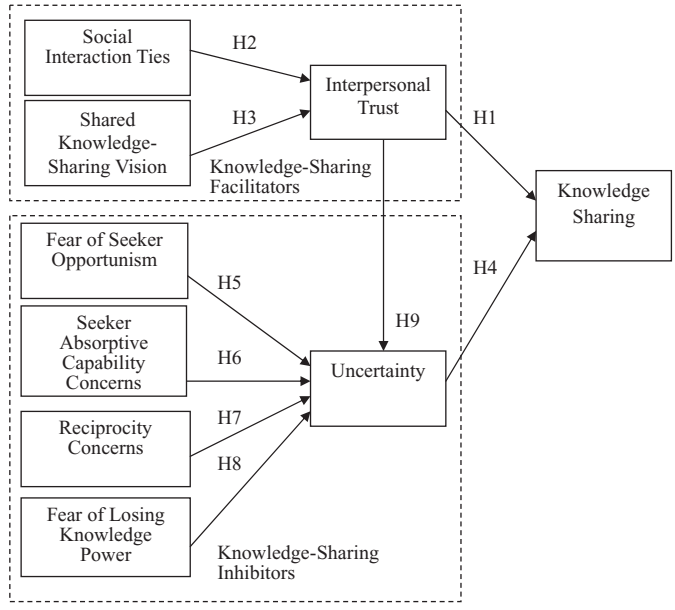

Figure 1. Research model.

2.1. Interpersonal trust as a knowledge-sharing facilitator

Trust refers to 'the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party' (Mayer *et al*., 1995, p. 712). The definition suggests that trust is an expectation that those others whom one chooses to trust will behave in a dependable and socially appropriate manner (Gefen *et al*., 2003). It also indicates a willingness of a party to be vulnerable to others (Gefen *et al*., 2003; Kankanhalli *et al*., 2005) because he or she believes that others will fulfil the expected commitment (Gefen *et al*., 2003).

SCT suggests that trust is a key aspect of relational capital (the asset derived from the relationships people have, through a history of interactions) and facilitator of individual behaviour (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998; Wasko & Faraj, 2005; Chiu *et al*., 2006). Prior studies have found that trust can affect individual behaviour in various contexts, such as e-commerce (e.g. Gefen *et al*., 2003; Liang *et al*., 2005), virtual communities (e.g. Chiu *et al*., 2006; Hsu *et al*., 2007) and intra-organisational knowledge sharing (e.g. Renzl, 2008; Staples & Webster, 2008) (see Table 1). In general, knowledge sharing is a form of

Table 1. Summary of studies that examined the relationship between trust and behaviour

Study	Context	Constructs	Findings
Ba & Pavlou (2002)	Online auction market (interpersonal trust)	Trust(TR) and Premium price (PP)	TR→PP
Gefen *et al*. (2003)	Online shopping (interpersonal trust)	Trust(TR) and Intended use (IU)	TR→IU
Liang *et al*. (2005)	Online prescription filling (interpersonal trust)	Trust(TR) and Intention (INT)	TR→INT
Doney & Cannon (1997)	Supply chain (interpersonal trust and Inter-organisational trust)	Buying firm's trust of supplier firm (TRSF), Buying firm's trust of salesperson (TRSP) and Anticipated future interaction (AFI)	TRSF→AFI TRSP→AFI
Chiu *et al*. (2006)	Virtual communities (interpersonal trust)	Trust (TR) and Quality of knowledge sharing (KSQ)	TR→KSQ
Hsu *et al*. (2007)	Virtual communities (interpersonal trust)	Identification-based trust (IBT) and Knowledge sharing behaviour (KS)	IBT→KS
Levin & Cross (2004)	Organisational knowledge sharing (interpersonal trust)	Benevolence-based trust (BBT), Competence-based trust (CBT) and Receipt of useful knowledge(RUK)	BBT→RUK CBT→RUK
Renzl (2008)	Organisational knowledge sharing (interpersonal trust in intra-organisation)	Trust in management (TR), Knowledge sharing within teams (KSWT) and Knowledge sharing between teams (KSBT)	TR→KSWT TR→KSBT
Staples & Webster (2008)	Organisational knowledge sharing (interpersonal trust in intra-organisation)	Trust within team (TR) and Knowledge sharing within team (KS)	TR→KS
Tsai & Ghoshal (1998)	Organisational resource exchange (interdepartmental trust)	Trust and trustworthiness (TR) and Resource exchange (RE)	TR→RE

→Positive influence.

social interaction (Bock & Kim, 2002). A central aspect of interpersonal interaction is the need to predict and understand the behaviour of others in a specific situation (Gefen, 2004). Some researchers also argue that interpersonal trust is so critical in social interactions because it reduces the possibility of unfavourable future actions of others and thus mitigates the sense of social complexity (Gefen *et al*., 2005). In this regard, interpersonal trust, 'one party's willingness to depend on the other party with a feeling of security even when negative consequences are possible' (Pennington *et al*., 2004, p. 199), is a vital factor affecting people's decision to share knowledge in organisations (Renzl, 2008). Accordingly, this study focuses on interpersonal trust.

A number of researchers agree that interpersonal trust is an important determinant of intra-organisational knowledge sharing (e.g. Nahapiet & Ghoshal, 1998; Levin & Cross, 2004), particularly in the setting in which knowledge management systems and other IT have been deployed (Staples & Webster, 2008). Other scholars also find that when individuals trust that their shared knowledge will be used appropriately, they are more willing to engage in knowledge sharing (McEvily *et al*., 2003). Additionally, empirical evidence supports the positive impact of interpersonal trust on intra-organisational knowledge sharing (Staples & Webster, 2008). Therefore, this leads to the first hypothesis.

H1: Interpersonal trust is positively associated with knowledge sharing.

2.2. Antecedents of interpersonal trust

SCT posits that trust (a key aspect of relational capital) can be affected by two further forms of social capital: structural capital and cognitive capital (Tsai & Ghoshal, 1998). Structural capital refers to the overall pattern of connections between actors, and is generally manifested as social interaction ties (Tsai & Ghoshal, 1998; Chiu *et al*., 2006). Cognitive capital refers to the resources providing shared representations, interpretations and systems of meaning among members. Prior studies argue that a shared vision is the major manifestation of cognitive capital (Tsai & Ghoshal, 1998; Chiu *et al*., 2006).

Social interaction ties refer to 'the strength of relationship, and the amount of time spent, and communication frequency among members' within an organisation (Chiu *et al*., 2006, p. 1877). Past studies suggest that individuals can develop trusting relationships in a frequent and close manner, which in turn enables them to collect more information about others (Tsai & Ghoshal, 1998). Individuals can better predict the possible actions of others based on past interaction history (Panteli & Sockalingam, 2005). Previous SCT literature has provided empirical evidence to support the link between social interaction ties and interpersonal trust (Levin & Cross, 2004). Therefore, we propose that:

H2: Social interaction ties are positively associated with interpersonal trust.

As noted by Tsai & Ghoshal (1998), 'a shared vision embodies the collective goals and aspirations of the members of an organization' (p. 467). In the prior literature, researchers have found that knowledge contributors tend to share their knowledge because they want to help

others to solve problems, enjoy pleasure from acts of helping others (Kankanhalli *et al*., 2005) and learn new knowledge from others (Wasko & Faraj, 2000). As such, in this study we propose that individuals who share the same goals and values about knowledge sharing in the organisation, including the desire to help others, enjoyment in helping others and learning from each other, hold a shared knowledge-sharing vision.

In general, a shared knowledge-sharing vision and pro-sharing norms are treated as two distinct concepts. According to past studies (Nahapiet & Ghoshal, 1998; Kankanhalli *et al*., 2005), a norm represents the degree of consequence and the expectations in a social system. A norm is a social pressure guiding an individual's behaviour. Thus, pro-sharing norms can enhance the climate that sharing knowledge are norms of an organisation (Kankanhalli *et al*., 2005). On the other hand, a shared knowledge-sharing vision represents collective goals and values about knowledge sharing. According to the view of self-regulation motivation (Wood & Bandura, 1989), people seek self-satisfaction from fulfilling their goals. The discrepancies between personal behaviour and goals will direct their actions to achieve desired outcomes. In this regard, a shared knowledge-sharing vision reflects human capabilities for self-direction and self-motivation that can enable people to pursue their goals regarding knowledge sharing.

Previous literature posits that a shared vision is a vital factor encouraging the development of trust. For example, Doney & Cannon (1997) suggest that when an individual perceives that other organisational members possess common goals and values, he or she will expect other organisational members to hold common beliefs regarding appropriate behaviour and policies. Trust will be created because shared values make it easier for members to predict others' future behaviour. Similarly, Tsai & Ghoshal (1998) postulate that organisation members tend to trust the members who share collective goals and values of an organisation, since it helps members within an organisation understand how to avoid possible misunderstanding in their communications and how to reduce the possibility of opportunistic behaviour. Accordingly, in the intra-organisational knowledge sharing context, we expect that people who share collective goals and values regarding knowledge sharing will be more likely to be considered as trustworthy by others in an organisation. This leads to the following hypothesis.

H3: A shared knowledge-sharing vision in the organisation is positively associated with interpersonal trust.

2.3. Uncertainty as a knowledge-sharing inhibitor

Uncertainty is commonly defined as 'the condition of being unsure about someone or something' (Priem *et al*., 2002, p. 727). Riegelsberger *et al*. (2005) posit that uncertainty describes situations in which adverse events or outcomes are possible. Pavlou *et al*. (2007) define uncertainty as the degree to which future conditions cannot be predicted, owing to imperfect information. Based on the above arguments, uncertainty in intra-organisational knowledge sharing can be defined as the extent to which contributors are uncertain as to whether their knowledge sharing may lead to their suffering adverse outcomes because of the difficulty of making predictions during knowledge sharing.

Table 2. Summary of studies that examined the relationship between uncertainty and behaviour

Study	Context	Constructs	Findings
Liang *et al*. (2005)	Online prescription filling	Opportunistic behaviour (OB), Information asymmetry (IA), Uncertainty (UN) and Intention (INT)	OB→UN→(-)INT IA→UN→(-)INT
Pavlou *et al*. (2007)	Online shopping	Perceived information asymmetry (PIA), Fears of opportunism (FSO), Information privacy concerns (IPC), information security concerns (ISC), Perceived uncertainty (PU), Purchase intention (PI) and Actual purchase (AP)	PIA→PU→PI→AP FSO→PU→PI→AP IPC→PU→PI→AP ISC→PU→PI→AP
Teo & Yu (2005)	Online shopping	Branding uncertainty (BRU), Performance uncertainty (PMU), Behavioural uncertainty (BHU), Environmental uncertainty (ENU), Transaction costs (TC) and Customer's willingness to buy online (CWBO)	PMU→TC→(-)CWBO BHU→TC→(-)CWBO ENU→TC→(-)CWBO
Kankanhalli *et al*. (2005)	Organisational knowledge sharing	Codification effort (CE), Loss of knowledge power (LKP), Trust (TRT) and Knowledge sharing (KS)	CE·TRT→(-) KS
Renzl (2008)	Organisational knowledge sharing	Fear of loosing one's unique value (FLUV), Knowledge sharing within teams(KSWT) and Knowledge sharing between teams (KSBT)	FLUV→(-)KSWT FLUV→(-)KSBT

→Positive influence; →(-)Negative influence.

Uncertainty is a central aspect in TCE theory (Premkumar *et al*., 2005; Teo & Yu, 2005). TCE states that uncertainty causes higher transaction costs (Liang *et al*., 2005) and an appropriate response to high uncertainty is to terminate the transaction (Teo & Yu, 2005). In fact, previous literature has found that uncertainty can be a major problem for individuals and influence their behaviour in a variety of contexts (see Table 2). In the knowledge sharing context, a prior study based on the perspective of TCE considers that knowledge sharing in organisations involves costs associated with activities by which individuals share their knowledge with others (Shin, 2004). Organisations should minimise the costs to facilitate knowledge sharing (Shin, 2004). From the knowledge contributors' perspective, sharing of knowledge is a behaviour involving uncertainty due to the fact that there is no explicit rule to guarantee that knowledge seekers will return the favour to justify their costs (Staples & Webster, 2008). As a result, the possible adverse outcomes might impede knowledge sharing. Therefore, we propose the following hypothesis.

H4: The knowledge contributor's uncertainty about the consequences of knowledge sharing is negatively associated with knowledge sharing.

2.4. Antecedents of uncertainty

TCE literature states that uncertainty arises from another party's opportunistic behaviour (Liang *et al*., 2005; Teo & Yu, 2005). Opportunism refers to the possibility that people may take

actions that serve their self-interest (Teo & Yu, 2005) without considering the benefit to others (Liang *et al*., 2005). That is, some individuals are not completely honest and reliable in their intentions in social interaction because they attempt to make use of unexpected circumstances to meet their own goals (Teo & Yu, 2005). In the current study, fear of seeker opportunism is defined as a knowledge contributor's concerns that knowledge seekers may act guilefully to pursue their own self-interest. Past studies have found that some knowledge seekers are not honest about their intentions when requesting knowledge in the context of knowledge sharing. They just want to make use of others to complete their work while making little or no effort themselves (Wasko & Faraj, 2000). The previous literature indicates that opportunistic behaviour by others can increase individual perceptions of uncertainty. For example, some scholars suggest that uncertainty is related to whether others will behave appropriately (Liang *et al*., 2005). Other researchers argue that the main purpose of building trust is to reduce uncertainty related to opportunistic behaviour (Ridings *et al*., 2002; Liang *et al*., 2005). Based on the arguments, we recognise that opportunistic behaviour is a source of uncertainty. Thus, we propose that:

H5: Fear of seeker opportunism is positively associated with the knowledge contributor's uncertainty.

From the viewpoint of TCE, uncertainty accompanies the possibility of an adverse outcome (Riegelsberger *et al*., 2005), which might potentially be harmful to an individual's interests (Teo & Yu, 2005). This argument offers a theoretical basis for us to propose the relationship between seeker absorptive capability concerns and uncertainty. Absorptive capability refers to the ability of knowledge seekers to recognise the importance and value of shared knowledge, to assimilate it and utilise it in a specific context (Ko *et al*., 2005). In this study, seeker absorptive capability concerns are defined as the contributor's beliefs regarding a seeker's inability to utilise the shared knowledge. Seeker absorptive capability concerns are believed to be related to knowledge contributors' perception of uncertainty because knowledge contributors must invest time and effort if they are to share their knowledge (Kankanhalli *et al*., 2005). When knowledge seekers cannot utilise shared knowledge due to their lack of absorptive capability (Szulanski, 1996; Huber, 2001), they may need to ask for further clarification and assistance. This will increase the knowledge contributors' costs, and diminish their motivation to share knowledge (Kankanhalli *et al*., 2005). Based on the above arguments, we propose that seeker absorptive capability concerns are positively associated with potentially adverse outcomes for knowledge contributors. Accordingly, we propose that:

H6: Concerns about the knowledge seeker's absorptive capability are positively associated with the knowledge contributor's uncertainty.

In addition, knowledge sharing literature reports that lack of reciprocity (i.e. a future request for knowledge may not be met by others) and loss of knowledge power are two key factors impacting knowledge contributors' interests (Huber, 2001). Based on the standpoint of TCE mentioned above, this study may propose that reciprocity concerns and fear of losing knowledge power may contribute to uncertainty as well. We discuss these in turn below.

Reciprocity is a sense of mutual indebtedness (Wasko & Faraj, 2005) and fairness (Wasko & Faraj, 2000). In intra-organisational knowledge sharing, reciprocity denotes knowledge contributors' expectations that current contributions will result in their own future requests for knowledge being met (Kankanhalli *et al*., 2005). In general, reciprocity can be considered a form of benefit derived from mutual participation in knowledge sharing (Kankanhalli *et al*., 2005; Wasko & Faraj, 2005). However, such a benefit cannot be achieved when knowledge seekers do not share in turn their own knowledge with knowledge contributors, or when knowledge seekers are unable to share good-quality knowledge with contributors. Accordingly, reciprocity concerns are defined as the perception by knowledge contributors that knowledge seekers will be unable to provide quality knowledge in return, or to respond to future knowledge requests by knowledge contributors. Generally, reciprocity concerns relate to knowledge seekers' willingness and ability to share knowledge. When knowledge contributors cannot predict whether knowledge seekers will respond to their own requests for knowledge in the future, they may worry that they cannot benefit from knowledge sharing. This may increase knowledge contributors' uncertainty related to knowledge sharing. Past literature indicates that concerns about reciprocity are an obstacle to knowledge sharing (Huber, 2001). Therefore,

H7: Concerns about reciprocity are positively associated with uncertainty.

Kankanhalli *et al*. (2005) suggest that knowledge contributors give up the benefits associated with their unique knowledge when they share that knowledge. Shin (2004) notes that knowledge contributors may feel apprehensive about the risk of being replaced after sharing specialised knowledge. In the study, fear of losing knowledge power can be defined as the knowledge contributors' perception that sharing knowledge may result in the loss of power and associated personal value derived from their knowledge. Many studies have found that fear of losing knowledge power is a key concern related to knowledge sharing, and one that leads to knowledge hoarding (Orlikowski, 1993; Davenport & Prusak, 1998; Kankanhalli *et al*., 2005). In fact, the negative relationship between fear of losing knowledge power and knowledge hoarding reflects a situation where individuals are anxious about giving away valuable knowledge while receiving few benefits in return (Renzl, 2008). Researchers also agree that the lack of sufficient benefits to compensate contributors for the loss of sharing knowledge becomes a key barrier for knowledge sharing (Huber, 2001; Bock *et al*., 2005). In this sense, we propose that uncertainty related to knowledge sharing may serve a mediating role between fear of losing knowledge power and knowledge sharing. We hypothesise that:

H8: Fear of losing knowledge power is positively associated with the knowledge contributor's uncertainty.

Prior literature suggests that trust is essentially needed only in situations which are characterised by uncertainty (Pavlou, 2003; Riegelsberger *et al*., 2005). Other scholars also argue that there would be no need to build trust if everything is predictable and certain (Liang *et al*., 2005). Trust is critical in social interactions as it reduce the risk of falling victim of others' undesirable, yet possible, behaviour (Pavlou, 2003). When individuals trust others, they believe that others will behave as expected, reducing the complexity of social interactions (Pavlou *et al*., 2007).

Based on the above discussion, we recognise that trust and uncertainty are closely related and the objective of building interpersonal trust is to reduce uncertainty related to knowledge sharing (Liang *et al*., 2005). Therefore, we propose the following hypothesis.

H9: Interpersonal trust reduces the knowledge contributor's uncertainty.

3. RESEARCH METHODOLOGY

To test the proposed research model, we adopted the survey method for data collection since it could enhance the generalisability of results (Kankanhalli *et al*., 2005). Participants were 288 employees from a variety of technical departments of telecommunications companies, since the telecommunication sector is a highly competitive, fast-moving and knowledge-intensive environment. The procedure of instrument development and data collection is described in detail in this section.

3.1. Measurement development

The questionnaire items were developed either by adapting measures that had been validated by prior research, or by converting the definitions of items developed using relevant theory and previous studies into a questionnaire format (Bock *et al*., 2005). As our respondents in Taiwan were Chinese-speaking, a Chinese version of the questionnaire was necessary for our subjects. Since the focus of this study is how to get people to share knowledge effectively in highly IT-mediated environments, the questionnaire was pretested using five information systems (IS) experts to assess its wording clarity, sequence of question items and contextual relevance. Overall, the experts indicated that the questionnaire was relatively clear and easy to complete. Several minor modifications were made to the wording and question item sequence based on comments from those experts. Following the pretest, an online pilot test involving 15 IS graduate students and 15 employees of a technology department in a public organisation was conducted to test the feasibility of the study. Respondents were asked to comment on the questionnaire's content and structure. The instrument was then modified slightly in accordance with those comments. For all measures, a seven-point scale was used with anchors ranging from strongly disagree (1) to strongly agree (7). Table 3 lists the measurement items.

Knowledge sharing was measured using five items adapted from Chiu *et al*. (2006) and Kankanhalli *et al*. (2005) to reflect the degree of individual knowledge sharing behaviour. The four items measuring social interaction ties were adapted from Chiu *et al*. (2006) and focused on the closeness of relationships, time spent on interpersonal interaction and frequency of communication with others. The three items for measuring a shared knowledge-sharing vision were adapted from Chiu *et al*. (2006) to reflect knowledge contributors' perceptions regarding whether or not others shared the same visions, goals and values concerning intra-organisational knowledge sharing. Interpersonal trust was assessed with items adapted from Chiu *et al*. (2006). The three items measured contributor beliefs regarding other people's non-opportunistic behaviour, promise keeping and trustworthiness.

Table 3. Measurement scales

Construct	Items	Mean	Standard. Deviation	Factor loading
Interpersonal Trust (TR) composite reliability = 0.93				
(Strongly disagree/strongly agree) (1–7 scale)				
TR1	People within my department will not take advantage of others even when the opportunity arises.	4.88	1.17	0.91
TR2	People within my department will always keep the promises they make to one another.	4.92	1.08	0.92
TR3	People within my department are truthful in dealing with one another.	4.96	1.19	0.90
Social Interaction Ties (SIT) composite reliability = 0.92				
(Strongly disagree/strongly agree) (1–7 scale)				
SIT1	I maintain close social relationships with people within my department.	5.35	0.95	0.89
SIT2	I spend a lot of time interacting with people within my department.	4.90	1.00	0.87
SIT3	I know people within my department on a personal level.	4.99	1.05	0.82
SIT4	I have frequent communication with people within my department.	5.18	0.91	0.86
Shared Knowledge-Sharing Vision (SV) composite reliability = 0.91				
(Strongly disagree/strongly agree) (1–7 scale)				
SV1	People within my department share the same goal of helping others solve their professional problems.	5.35	1.06	0.84
SV2	People within my department share the same goal of learning from each other.	4.97	1.18	0.89
SV3	People within my department share the same value that helping others is pleasant.	5.00	1.09	0.91
Uncertainty (UN) composite reliability = 0.82				
(Strongly disagree/strongly agree) (1–7 scale)				
UN1	I feel that sharing my knowledge in my department involves a high degree of uncertainty.	2.68	1.12	0.81
UN2	I feel that it is difficult to predict the outcome of my knowledge sharing.	4.32	1.44	0.69
UN3	It is difficult to ensure that sharing my knowledge could help me to achieve my performance objectives.	3.61	1.44	0.82
Fear of Seeker Opportunism (FSO) composite reliability = 0.92				
(Strongly disagree/strongly agree) (1–7 scale)				
FSO1	When I share my knowledge, I believe that people within my department will not use the knowledge shared by me to pursue their personal benefits (reverse coded).	2.95	1.36	0.88
FSO2	When I share my knowledge, I believe that people within my department will not lie in order to obtain my knowledge (reverse coded).	2.56	1.71	0.92
FSO3	When I share my knowledge, I believe that people within my department will not exaggerate their problems to get the knowledge they want (reverse coded).	2.56	1.12	0.88
Seeker's Absorptive Capability Concerns (SACC) composite reliability = 0.94				
(Strongly disagree/strongly agree) (1–7 scale)				
SACC1	When I share my knowledge, I am concerned that people within my department do not have the related competence to absorb the knowledge shared by me.	3.56	1.45	0.91
SACC2	When I share my knowledge, I am concerned that people within my department cannot solve their problems by using the knowledge shared by me.	3.77	1.44	0.91
SACC3	When I share my knowledge, I am concerned that people within my department do not have the necessary skills to use the knowledge shared by me.	3.60	1.37	0.91

Table 3. Cont.

Construct	Items	Mean	Standard. Deviation	Factor loading
Reciprocity Concerns (RC) composite reliability = 0.97				
(Strongly disagree/strongly agree) (1–7 scale)				
RC1	I believe that people within my department will help me in the future (reverse coded).	2.71	1.09	0.90
RC2	I believe that my queries for knowledge will be answered in the future (reverse coded).	2.67	1.07	0.94
RC3	I believe that I can get knowledge back when I need it in the future (reverse coded).	2.74	1.08	0.95
RC4	I believe that people within my department will contribute trustworthy knowledge to me in the future (reverse coded).	2.72	1.04	0.95
RC5	I believe that people within my department will contribute helpful knowledge to me in the future (reverse coded).	2.75	1.07	0.95
Fear of Losing Knowledge Power (LKP) composite reliability = 0.91				
(Strongly disagree/strongly agree) (1–7 scale)				
LKP1	I am concerned that I would feel a loss if I share my knowledge that no one else has.	2.73	1.24	0.94
LKP2	I am concerned that I would lose my unique value when I share my knowledge.	2.71	1.25	0.96
LKP3	I am concerned that I may lose my position when I share knowledge.	2.56	1.17	0.96
Knowledge Sharing (KS) composite reliability = 0.94				
(Strongly disagree/strongly agree) (1–7 scale)				
KS1	I frequently contribute my knowledge to other people within my department.	4.94	1.14	0.82
KS2	I usually actively share my knowledge with others in my department.	4.94	1.16	0.92
KS3	I usually spend a lot of time conducting knowledge sharing activities in my department.	4.72	1.18	0.91
KS4	I usually spend a lot of time in discussing the complicated problems with other people within my department.	4.66	1.23	0.94
KS5	I usually involve myself in discussions of various topics rather than specific topics.	4.84	1.16	0.85

Furthermore, uncertainty was assessed using items adapted from Pavlou *et al*. (2007) and developed from Pavlou *et al*. (2007) and Teo & Yu (2005). The three items focused on knowledge contributors' perceptions of adverse outcomes resulting from knowledge sharing. Fear of seeker opportunism was measured using three items developed based on Bergen *et al*. (1992), Eisenhardt (1989), Jap & Anderson (2003), and Wright *et al*. (2001) to reflect knowledge contributors' beliefs in the opportunistic behaviour of seekers. As for the antecedents of uncertainty, three items for measuring seeker absorptive capability concerns were adapted from Ko *et al*. (2005) to reflect the concerns of knowledge contributors regarding the ability of knowledge seekers to use shared knowledge. Reciprocity concerns were measured using five items adapted from Kankanhalli *et al*. (2005), Ko *et al*. (2005), and Wasko & Faraj (2005), and developed based on Ko *et al*. (2005). The measure stressed the fairness of knowledge sharing and the quality of shared knowledge. Fear of losing knowledge power was assessed using three items adapted from Kankanhalli *et al*. (2005) and Wasko & Faraj (2005). The items were used to measure knowledge contributors' concerns about possible loss of power and value as a result of knowledge sharing.

3.2. Survey administration

Following Samieh & Wahba (2007), the research model was tested using data collected from employees of network technology departments, IT departments, service and product development departments, mobile handset departments and enterprise application departments of five major telecommunications companies in Taiwan. The combined market share of these five major companies is greater than 96%, according to the Focus on Internet News and Data of the Advanced e-Commerce Institute (ACI-FIND, 2008), a well-known research team that provides professional information on IT trends under the Institute for Information Industry in Taiwan. The average number of employees in each company is around 1500 people.

Generally, the rapid pace of technological change in the telecommunication industry leads employees in those departments to seek and rely upon external and internal knowledge to meet their needs at work. Sharing external and internal knowledge with other members of a department is considered an efficient way to generate innovative ideas (Hoegl *et al*., 2003; Belanger & Allport, 2008). Furthermore, phone interviews with employees of those departments show that knowledge repository, one of the most common forms of knowledge management system, and other IT (e.g. email, NetMeeting and videoconferencing techniques) have been deployed to facilitate the sharing and dissemination of knowledge. Employees thus often use IT to share their knowledge, collaborate and communicate with others. Based on the interviews, we recognise that work environments in these companies are highly IT-mediated and that knowledge sharing within respondents' departments routinely occurs through mixed communication channels, including face-to-face communication as well as through IS. Given the above, this study considers that the employees in this industry are suitable subjects for this study.

This study used an online survey to collect empirical data. An online survey is a widely accepted method in the IS field, and has some advantages over a paper-based mail survey such as lower cost and faster response (Bhattacherjee, 2001). The survey was conducted over a period of 6 months, from mid to late 2007. With the assistance of managers from the technical departments in these companies, 288 employees received an email message containing a hyperlink to the online survey form. The message began by describing the purpose of the study and providing an assurance of confidentiality, following Chiu *et al*. (2006). As an incentive, 30 randomly selected respondents were offered a gift certificate equivalent to US$15. Following the data collection, a total of 162 questionnaires were obtained giving a response rate of 56%. Eight invalid questionnaires were excluded, resulting in a total of 154 usable questionnaires for further analysis. Table 4 lists demographic information about the respondents.

4. DATA ANALYSIS AND RESULTS

A partial least squares (PLS) (Chin, 1998) method of structural equation modelling using SmartPLS 2.0 M3 (Organization: SmartPLS City: Hamburg, Germany (http://www.smartpls.

Table 4. Demographics of samples

Demographics		No.	Percentage (%)
Gender	Male	87	56.5
	Female	67	43.5
Age	21–30	23	14.9
	31–40	118	76.6
	41–50	11	7.1
	51–60	2	1.4
Education	Junior college	9	5.9
	University	86	55.8
	Graduate school or above	59	38.3
Job title	Director	6	3.9
	Manager	27	17.5
	Project manager	18	11.7
	Assistant manager	16	10.4
	Engineer	44	28.6
	Specialist	16	10.4
	Others	27	17.5
Work experience	Less than 1 year	6	3.9
	1–2 years	9	5.8
	2–3 years	14	9.1
	3–5 years	30	19.5
	6–10 years	67	43.5
	Over than 10 years	28	18.2
Department	Network technology	31	20.1
	Information technology	22	14.3
	Service and product development	90	58.4
	Mobile handset and enterprise application	11	7.1

de)) was employed to test the hypotheses. PLS appears appropriate for use in this study because it places minimal restrictions on sample size and residual distributions (Pavlou *et al*., 2007). Following the recommendations of Anderson & Gerbing (1988), the analytical procedure is presented in two distinct stages: the assessment of the reliability and validity of the measurement model, and the assessment of the structural model.

4.1. Measurement model

The adequacy of the measurement model was assessed by examining internal consistency and the convergent and discriminant validities. Internal consistency was assessed using composite reliability values. As shown in Table 3, all composite reliability values were greater than 0.8, well above the common acceptance level of 0.7 (Gefen *et al*., 2000). Moreover, average variance extracted (AVE), factor loadings and correlation were calculated to assess

Table 5. Correlations and average variance extracted (AVE)

	AVE	TR	SIT	SV	UN	FSO	SACC	RC	LKP	KS
TR	0.83	**0.91**								
SIT	0.74	0.55**	**0.86**							
SV	0.78	0.69**	0.67**	**0.88**						
UN	0.60	–0.36**	–0.31**	–0.42**	**0.77**					
FSO	0.80	–0.45**	–0.35**	–0.29**	0.35**	**0.89**				
SACC	0.83	–0.14	–0.12	–0.20*	0.40**	0.21**	**0.91**			
RC	0.88	–0.43**	–0.51**	–0.52**	0.38**	0.43**	0.18*	**0.94**		
LKP	0.91	–0.22**	–0.20*	–0.20**	0.48**	0.29**	0.40**	0.24**	**0.95**	
KS	0.80	0.28**	0.54**	0.44**	–0.29**	–0.21*	–0.02	–0.20*	–0.20*	**0.89**

Diagonal elements (in bold) are the square root of the Average variance extracted AVE. Off-diagonal elements are the correlations among constructs.

*$p < 0.05$; **$p < 0.01$.

TR, Trust; SIT, Social Interaction Ties; SV, Shared Knowledge-Sharing Vision; UN, Uncertainty; FSO, Fear of Seeker Opportunism; SACC, Seeker's Absorptive Capability Concerns; RC, Reciprocity Concerns; LKP, Fear of Losing Knowledge Power; KS, Knowledge Sharing.

convergent and discriminant validities. Table 5 shows AVE, the square root of AVE and correlations between constructs. Clearly, all AVEs exceed the recommended level of 0.5. As summarised in Table 3, most items exhibit loading higher than 0.7; the only exception being the second item of uncertainty (UN2) with loading of 0.69, which is slightly below 0.7. Nevertheless, it is still above the cut-off value of 0.6 suggested by Bagozzi & Yi (1988). In addition, all the square roots of AVE values exceed the correlation between the construct and other constructs in the model (Fornell & Larcker, 1981). These results demonstrate the adequate convergent and discriminant validity of constructs in the model (Jarvenpaa & Majchrzak, 2008).

This study argues that trust and uncertainty are two important determinants of knowledge sharing and trust reduces uncertainty. This implies that these two constructs are conceptually related. In addition, the correlation between social interaction ties and a shared knowledge-sharing vision is 0.67, while a shared knowledge-sharing vision and interpersonal trust are found to be correlated at 0.69. The high correlation between these constructs may lead to multicollinearity and obscure the relationships between constructs (Thatcher & Perrewe, 2002). To test multicollinearity, we calculated variable inflation factor (VIF) for the constructs in the model. According to Hair *et al*. (1998), multicollinearity results when VIF exceeds 10. The results show the VIF did not exceed 2.8, thus, the problem of multicollinearity does not influence the results of the study.

Given that data were collected through self-report measures, we took several steps to address the potential threat of common method bias. First, this study followed two design producers that could help reduce such bias: guaranteeing respondent anonymity, and refining questionnaire items through pretest (Podsakoff *et al*., 2003; Barki *et al*., 2007). After the data collection, we assessed common method bias. Past literature indicates that common method bias usually results in high correlations (Vance *et al*., 2008). The correlation matrix (see Table 5) shows all the correlations to fall below the cut-off value of 0.9, as suggested by Vance

et al. (2008). The test for multicollinearity also reports that the correlation does not significantly impact the results (Thatcher & Perrewe, 2002). Thus, the results indicate that our data have not suffered any threat to the validity of the findings due to high common method variance.

4.2. Structural model

Assessing the structural model involves estimating the path coefficients and R^2 value. The bootstrapping technique with 500 interactions was employed to determine the significance of the paths within the structural model (Ko *et al*., 2005). The sample size of the study exceeds the required sample size for medium effect size at statistical power = 0.8 and $\alpha = 0.01$ (Cohen, 1992). Thus, our sample size is adequate.

Figure 2 shows the results of the structural model. Most paths are significant, except for that between fear of seeker opportunism and uncertainty ($\beta = 0.11$), meaning that Hypothesis 5 is not supported. As expected, interpersonal trust is significantly associated with knowledge sharing ($\beta = 0.20$, $p < 0.05$), supporting Hypothesis 1. Social interaction ties ($\beta = 0.15$, $p < 0.05$) and a shared knowledge-sharing vision exhibited strong effects on trust ($\beta = 0.60$, $p < 0.001$) so that Hypotheses 2 and 3 are supported. Furthermore, the path between uncertainty and knowledge sharing is significant ($\beta = -0.25$, $p < 0.01$). This result supports Hypothesis 4. As expected, uncertainty is predicted by seeker absorptive capability concerns ($\beta = 0.19$, $p < 0.05$), reciprocity concerns ($\beta = 0.15$, $p < 0.1$) and fear of losing knowledge power ($\beta = 0.34$, $p < 0.001$). Thus Hypotheses 6, 7 and 8 are supported. Finally, interpersonal trust has negative influence on uncertainty ($\beta = -0.17$, $p < 0.05$), indicating that Hypothesis 9 is supported.

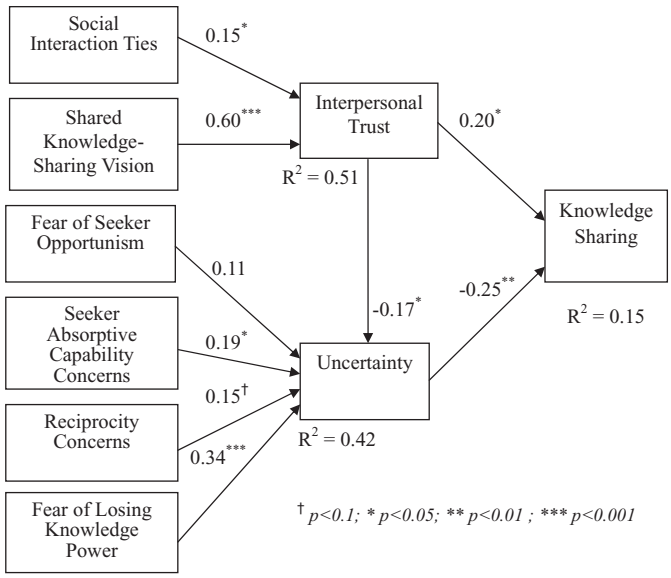

Figure 2. Results of structural model.

Figure 2 also shows the explanatory power of the research model, which explains approximately 15% of the variance in knowledge sharing, 51% of the variance in interpersonal trust and 42% of the variance in uncertainty. All the R^2 values exceed 10%, indicating acceptable explanatory power (Bock *et al*., 2006).

On the other hand, to assess the mediating effect of uncertainty we employed Baron & Kenny's (1986) test, following Pavlou *et al*. (2007). The results show that fear of seeker opportunism, seeker absorptive capability concerns, reciprocity concerns and fear of losing knowledge power do not have significant effects on knowledge sharing when uncertainty is removed ($\beta = -0.06$, 0.024, –0.06, –0.15, respectively), although seeker absorptive capability concerns, reciprocity concerns and fear of losing knowledge power have significant influence on uncertainty initially. In addition, the four uncertainty antecedents have no significant influence on knowledge sharing behaviour when uncertainty was included as an independent variable in the model ($\beta = -0.035$, 0.07, –0.03, –0.07, respectively). Therefore, uncertainty fully mediates the relationship between the antecedents of uncertainty and knowledge sharing.

5. DISCUSSION

5.1. Key findings

Many factors may influence individual knowledge sharing in the organisational context. The aim of this study was to examine two critical factors, interpersonal trust and uncertainty. Our results provide support for most of the hypothesised relationships in the theoretical model. The results indicate that interpersonal trust is vital in encouraging knowledge sharing in highly IT-mediated work environments. This is consistent with several earlier studies (e.g. Levin & Cross, 2004; Staples & Webster, 2008), providing additional evidence to confirm the relationship between interpersonal trust and knowledge sharing in the organisational contexts, particularly in highly IT-mediated environments. As hypothesised, these results show that social interaction ties and a shared knowledge-sharing vision exercise positive effects on interpersonal trust. The finding extends the prior literature (Tsai & Ghoshal, 1998) by indicating that social interaction ties and a shared vision are not only the antecedents of interunit trust, but also the factors affecting interpersonal trust in the organisation setting.

Study results also demonstrate that uncertainty hinders willingness of individuals working in highly IT-mediated, knowledge-intensive environments to share knowledge with their department peers. The findings are similar to assertions in the previous literature of electronic commerce (e.g. Liang *et al*., 2005; Pavlou *et al*., 2007), indicating that uncertainty is also a vital factor that may impede IS usage in the intra-organisational knowledge sharing setting. On the other hand, we find that seeker absorptive capability concerns maintain a significant relationship with uncertainty. Similar to several earlier studies (Szulanski, 1996; Huber, 2001), this finding confirms that seeker cognitive problems (lack of absorptive ability) play an important role in the setting of intra-organisational knowledge sharing. Our results also provide some

indication that fear of losing knowledge power and reciprocity concerns significantly affect knowledge contributors' feelings of uncertainty. The finding is in line with previous literature (Huber, 2001; Kankanhalli *et al*., 2005), suggesting that the loss of knowledge power and reciprocity concerns are important barriers to intra-organisational knowledge sharing.

A surprising result is that fear of seeker opportunism does not significantly affect uncertainty. This finding is contrary to the perspective of TCE that opportunism is a predictor of uncertainty (Liang *et al*., 2005; Teo & Yu, 2005). Therefore, an additional PLS analysis was performed, which indicated that the path coefficient of fear of seeker opportunism increased from 0.11 to 0.21 by removing reciprocity concerns. The result shows that the influence of seeker opportunism on uncertainty will decline, once the reciprocity concerns are taken into account. Finally, the results of the study reveal that interpersonal trust affects uncertainty significantly and the effect of uncertainty is stronger on knowledge sharing than interpersonal trust. The finding is in line with prior literature (Liang *et al*., 2005), indicating that trust is developed to reduce uncertainty perception and uncertainty plays a mediating role between trust and knowledge sharing in the intra-organisational knowledge sharing setting as well.

5.2. Implications for theory

The results of the study provide several implications for theory, from which some directions for further research can be derived. First, the empirical results indicate that both interpersonal trust and uncertainty have a negative effect upon knowledge sharing and that trust could reduce uncertainty. Similar to the prior literature of e-commerce (e.g. Liang *et al*., 2005), the findings reveal that knowledge sharing in highly IT-mediated environments involves uncertainty, and the building of trust facilitates the sharing of knowledge by individuals. The results demonstrate the value of integrating SCT and TCE to validate the factors facilitating and inhibiting knowledge sharing in knowledge-intensive and highly IT-mediated work environments.

By using Tsai & Ghoshal's (1998) work, the study shows that social interaction ties and a shared knowledge-sharing vision facilitate interpersonal trust in the organisational context. However, previous research on e-commerce suggests that interpersonal trust can be influenced by other factors, such as calculativeness (costs and benefits) and institutional structures (Ba & Pavlou, 2002). Further studies should examine what may influence trust in the organisational setting from various perspectives. Moreover, previous studies argue that trust can be expanded to include not only interpersonal trust but also other types of trust, such as system trust (the perceived reliability of a system or institution) and dispositional trust (the extent to which one displays a tendency to trust others) (Leimeister *et al*., 2005). Further studies examining the link between trust and knowledge sharing are called for to validate the impact of other types of trust on knowledge sharing and investigate their antecedents in the organisational context.

Furthermore, although uncertainty has already been shown to influence knowledge sharing (e.g. Huber, 2001; Kankanhalli *et al*., 2005), previous views are incomplete. In general, prior literature views uncertainty as a background mediator (Pavlou *et al*., 2007) and thus considers concerns about loss of knowledge power, reciprocity and seeker's absorptive capability

as directly affecting knowledge sharing (e.g. Kankanhalli *et al*., 2005; Ko *et al*., 2005). By using the perspective of TCE to a knowledge sharing context, this study delineates that the influence of these variables on knowledge sharing is fully mediated by uncertainty. The results provide a possible explanation for Kankanhalli *et al*.'s (2005) finding that loss of knowledge power does not have a direct influence on knowledge sharing in an organisational context. The results also provide a theoretical explanation for the insignificant link between reciprocity and helpfulness of contribution and the significant negative correlation between reciprocity and volume of contribution in the study of Wasko & Faraj (2005). Overall, the finding contributes to advance our enhanced understanding of the mediating role of uncertainty that has been overlooked in the knowledge sharing literature. Finally, by introducing and validating four key antecedent sources of uncertainty, this study suggests the need to seek further theoretical explanations about why uncertainty mediates the effects of the antecedent sources on knowledge sharing, and to extend the model with additional mediators and their antecedents. This also raises an interesting issue: how to mitigate uncertainty perception as to knowledge sharing.

5.3. Implications for practice

The results of this study also provide some useful implications for practitioners interested in improving organisational knowledge management. First, to stimulate the use of knowledge management systems and other IT for sharing knowledge, managers should make efforts to establish trustworthy relationships within the organisation based on social interaction ties and a shared knowledge-sharing vision. Prior literature argues that structural link could be strengthened by frequent social interactions and a shared vision may develop through hands-on experience over time (Wasko & Faraj, 2005). Managers may invite experienced members and professional instructor to share their experience of knowledge sharing with members in the organisation to increase social interactions and to form a set of shared values and goals regarding knowledge sharing (Chiu *et al*., 2006).

Second, the findings provide direction for managers with regard to reducing knowledge contributors' perceptions of uncertainty, which may thus encourage knowledge sharing behaviours in highly IT-mediated environments. Managers should organise training programs to improve the absorptive capabilities of knowledge seekers, since concerns about absorptive capabilities are associated with inadequate background knowledge, as observed by Huber (2001). Past research has found that people who regularly share knowledge with others may receive a quick response when they themselves ask for help (Kankanhalli *et al*., 2005). To mitigate reciprocity concerns, managers can invite experienced knowledge contributors to describe how they have benefited from knowledge sharing (Kankanhalli *et al*., 2005). Researchers have observed that individuals who take the time to share their knowledge are motivated by the perception that they have the opportunity to advance their own image (He & Wei, 2009) and status (Huber, 2001). Thus, to combat fear of losing knowledge power, managers should help knowledge contributors enhance their reputation within the company, promoting them as well as rewarding them through other means (Huber, 2001;

Kankanhalli *et al*., 2005). Such policies may make knowledge contributors feel that it is possible to retain the power and value of their knowledge, despite sharing it with others (Bock *et al*., 2005).

Third, the path coefficients from the four antecedents of uncertainty provide empirical evidence that fear of losing knowledge power impacts most strongly upon uncertainty. This finding suggests that knowledge contributors are more concerned with loss of knowledge power than with others' absorptive capability, and others' opportunistic behaviour when sharing their knowledge. This implies that measures to reduce fear of losing knowledge power should be given higher priority.

Finally, the results of the study will help managers to develop systems that facilitate trust and dissuade the development of uncertainty as well. In general, using IT to share knowledge will remove the interpersonal connection and thus some signals presented in face-to-face may not be available or become distorted during knowledge sharing. The loss of information in highly IT-mediated environments increases uncertainty and results in lower trust (Riegelsberger *et al*., 2005). From the view of social presence theory, in order to build trust and mitigate uncertainty, the ability of media in transmitting social presence should be improved in an attempt to facilitate awareness of the other person and interpersonal relationships (Riegelsberger *et al*., 2005). Also, according to media richness theory, multiplicity of cues and immediacy of feedback are two factors affecting social perceptions (Kahai & Cooper, 2003). Taking these into account, in addition to providing asynchronous communication tools (e.g. email) that enables employees to share explicit knowledge (e.g. written documents), managers are advised to deploy synchronous communication tools (e.g. peer-to-peer communication systems, instant message and NetMeeting) to allow people to interpret and clarify the shared messages and knowledge instantly to facilitate higher level of communication and interpersonal interaction.

5.4. Limitations

Although the findings are useful and encouraging, we must acknowledge that some limitations exist in the current study. First, although the study has invested considerable effort in data collection, the results are limited to the telecommunications industry. Further study is required to assess the extent to which the framework of this research might be applied to other industries. Second, the antecedents of uncertainty were limited to the behaviour of knowledge seekers and related factors (i.e. behavioural uncertainty), and excluded environmental sources (i.e. environmental uncertainty). Further studies should adopt an integrated perspective when examining the sources of uncertainty regarding knowledge sharing.

Third, this study was cross-sectional. It is difficult to examine changes in trust due to the dynamic interaction between knowledge contributors and knowledge seekers. In this perspective, a longitudinal study tracing the long-term behaviour of individuals within an organisation may yield a richer understanding of bidirectional effects and how behavioural patterns can be shaped over time. Fourth, the findings may be vulnerable to the threat of conducting survey in a specific country, for trust and uncertainty might be related to cultural diversity (e.g. de Mooij

& Hofstede, 2002; Huff & Kelley, 2003; Gefen *et al*., 2005). Further research should pay special attention to assess the extent to which this study's results are applicable in diverse countries and cultures. Fifth, we examine the factors affecting intra-departmental knowledge sharing in highly IT-mediated environments. Further research is needed to confirm the generalisability of the results to departments in other organisations where employees share their knowledge by using knowledge management systems specifically. Further studies should be also conducted to examine whether the study's results are applicable to the context of inter-departmental knowledge sharing. Finally, knowledge sharing involves two actors: knowledge contributors and knowledge seekers. This study examined only one aspect of knowledge exchange, knowledge sharing, and did not examine the individuals who participate in seeking and using knowledge. However, as noted by Kankanhalli *et al*. (2005), successful knowledge management requires that knowledge contributors be willing to share their knowledge, and knowledge seekers to employ that shared knowledge. While knowledge sharing is an important activity in organisational knowledge management, knowledge seeking and use can enhance the value of that knowledge and contribute to an organisation's capabilities (Alavi & Leidner, 2001). Further research is needed to advance our understanding of how knowledge seeking might be encouraged, and the factors that can influence knowledge seeking (Bock *et al*., 2006).

6. CONCLUSIONS

In today's economy, knowledge has been regarded as an important resource for sustaining an organisation's competitive capability and business performance. It is important for researchers and practitioners to understand how to promote knowledge sharing. Drawing on the perspectives of interpersonal trust and uncertainty, an empirical study to examine the factors facilitating or inhibiting knowledge sharing behaviour in an organisational context was conducted. The findings suggest that interpersonal trust has a positive effect on knowledge sharing, while uncertainty has a negative effect upon knowledge sharing. The results of the study also show that social interaction ties and shared knowledge-sharing vision are the antecedents of interpersonal trust, and that uncertainty related to knowledge sharing is increased by seeker absorptive capability concerns, reciprocity concerns and fear of losing knowledge power. Generally, this study has provided some interesting insights into the ways in which facilitators and inhibitors can impact upon knowledge sharing. We hope that these initial results may encourage others to further refine the model, and to advance our understanding of what facilitators and inhibitors may impact knowledge sharing.

ACKNOWLEDGEMENTS

The authors would like to thank the associate editor and three anonymous reviewers for their constructive and helpful comments on the paper.

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