The individual and social dynamics of knowledge sharing: an exploratory study

Sylvio Cyr
Meta RIM Consultants Ltd, Hong Kong, and

Chun Wei Choo
Faculty of Information, University of Toronto, Toronto, Canada

Abstract

Purpose – This paper aims to examine how knowledge sharing behavior is influenced by three sets of dynamics: a rational calculus that weighs the costs and benefits of sharing; a dispositional preference that favors certain patterns of sharing outcomes; and a relational effect based on working relationships.

Design/methodology/approach – Concepts from social exchange theory, social value orientation, and leader-member exchange theory are applied to analyze behavioral intentions to share knowledge. The study population consists of employees of a large pension fund in Canada. Participants answered a survey that used allocation games and situational vignettes to measure social value orientation, propensity to share knowledge, and perception of cost and benefit.

Findings – The results suggest that personal preferences about the distribution of sharing outcomes, individual perceptions about costs and benefits, and structural relationship with knowledge recipients, all affect knowledge sharing behavior significantly. Notably, it was found that propensity to share knowledge is positively related to perceived benefit to the recipient, thus suggesting that evaluation of cost and benefit in social exchange is not limited to self-interest, but is also influenced by perceived recipient benefit. Moreover, it was found that the relationship with the sharing target (superior or colleague) also influenced sharing.

Originality/value – Most studies emphasize the organizational benefits of knowledge sharing. This study examines knowledge sharing from the perspective of the individual who approaches knowledge sharing as a social exchange that involves perceptions of costs and benefits, preferences about sharing outcomes, and relationship with the sharing target. The study also introduces innovative methods to measure social value orientation and propensity to share knowledge.

Keywords Knowledge sharing, Social dynamics, Value analysis, Canada

Paper type Research paper

1. Introduction

For an organization, the sharing of knowledge among its employees promises many benefits: it allows the organization to build on past experience and knowledge, respond more quickly to problems, develop new ideas and insights, and avoid reinventing the wheel or repeating past mistakes. For the individual on the other hand, the sharing of knowledge is a more equivocal proposition. It requires time and effort to share knowledge; and there is often concern about the loss of hard-earned knowledge, and doubt about how the knowledge would be received and put to use by others. It is this tension between organizational intent and individual ambivalence that renders knowledge sharing such a significant challenge in organizations. The dynamics of this

tension is played out at the level of the individual, but while much research has examined methods and systems that can facilitate knowledge sharing, there is less research on the factors that may influence an individual's willingness to share knowledge with others in an organization. This study considers knowledge sharing from the perspective of the individual who approaches knowledge sharing as a social exchange between self and other. We examine the effect of individuals' attitudes and perceptions on their decisions whether or not to share knowledge with a colleague. We adapt concepts from social exchange theory to analyze if employees' knowledge sharing intentions are influenced by their perceptions of the costs and benefits of doing so. We apply the typology of social value orientation to identify individual preferences for outcome distributions in sharing situations, and ask if different preferences lead to different perceptions of knowledge sharing costs and benefits. We consider the requester's locus in an organizational hierarchy, and ask if this structural relationship affects knowledge sharing. Our research questions thus focus on three underexplored aspects of knowledge sharing as social exchange that is shaped by individual attitudes and norms:

- Do perceived costs to the informer of sharing knowledge and perceived benefits to the recipient affect one's willingness to share?

- Do personal preferences for outcome distributions in sharing situations affect one's intention to share knowledge?

- Does an individual's propensity to share knowledge differ when sharing with different sharing targets?

The paper is in five sections. Following this introduction we develop the theoretical background and research hypotheses. The next section outlines research methods. Results of the data analysis and hypotheses testing are presented next. The last section summarizes and discusses the findings.

2. Theoretical background and hypotheses development
Knowledge sharing
Knowledge sharing in organizations may be viewed as the behavior by which an individual voluntarily provides other members of the organization with access to his or her knowledge and experiences. Knowledge sharing encompasses a broad range of behaviors that are complex and multi-faceted. For example, while technology provides the tools for sharing information and knowledge, the possibilities for doing so are not necessarily taken advantage of. Research has found that knowledge sharing is shaped by many factors, including the culture of the organization, the nature of the technology, and the individual's values and attitudes towards sharing (Oliver, 2008; Widén-Wulff and Ginman, 2004; Hall, 2003).

Since knowledge sharing is assumed to be voluntary and volitional, one focus of past research has been on the individual's willingness, intention, or propensity to share knowledge with a co-worker. Research to date approaches the concept of propensity to share in two ways. In one variation, propensity to share knowledge is part of the expression of self-identity, so that if being regarded as knowledgeable is important in self-identity, then the individual is motivated to share (e.g. Constant *et al.*, 1994). In a second variation, one that we adopt in this study, it is a subjective norm, a willingness to share that constitutes an attitude or personal norm. Thus, Jarvenpaa and Staples

(2000, p. 135) state that "[p]ropensity to share is a personal norm reflecting the costs and benefits of sharing. ... propensity to share information relates to a specific personal norm that is influenced by the greater context".

This study conceptualizes knowledge sharing as a form of social exchange that is moderated by the social value orientation of the individual. As social exchange, we see knowledge sharing as an exchange of a valuable resource between two parties which is expected to incur costs borne by the knowledge owner and bestow benefits to the recipient. An individual's propensity to share her knowledge would then depend on her consideration of these costs and benefits. The study further suggests that the propensity to share also depends on the individual's social value orientation. This refers to the individual's preferences (her subjective attitudes or norms) regarding the distribution of outcomes to self and other in the sharing situation. We will elaborate on both concepts of social exchange and social value orientation in subsequent sections.

Studies of organizational knowledge sharing typically look at two types of knowledge exchange situations. The first refers to employees contributing and retrieving knowledge to and from a central database or knowledge repository (Cress et al., 2007; Weiss, 1999). Knowledge that resides in a system is often considered a public good (Cabrera and Cabrera, 2002; Galletta et al., 2003) – a shared resource from which every member may benefit, but requires voluntary contributions for its existence. The public good view of knowledge sharing is common in research on knowledge management systems implementation but it may not address the individual perspective adequately.

The second knowledge exchange situation occurs when employees share with others the knowledge they have acquired or created. This situation is different from the previous systems-mediated approach in that there is the social presence of another individual. In this case research is interested in what are the motivational factors that can increase an individual's willingness to share. Bock et al. (2005) reviewed the literature on knowledge sharing and identified three levels of motivational factors: individual, group, and organizational. At the individual level, the person's attitude toward knowledge sharing, the person's sense of self-worth through sharing, and the expected reciprocal relationships from others, are the major factors affecting behavioral intention to share. This individual perspective on knowledge sharing has received less attention in the literature and is the one adopted in this paper.

Knowledge sharing behavior may also be influenced by the type of knowledge to be shared. Based on the work of Polanyi (1962), Nonaka and Takeuchi (1995, p. 8) drew a distinction between tacit and explicit knowledge:

> Tacit knowledge is highly personal and hard to formalize, making it difficult to communicate or to share with others. Subjective insights, intuitions, and hunches fall into this category of knowledge. Furthermore, tacit knowledge is deeply rooted in an individual's action and experience, as well as in the ideals, values, or emotions he or she embraces.

On the other hand, explicit knowledge is knowledge that has been codified formally using a system of symbols, or made tangible as a physical artifact, and can therefore be more easily shared. While the assumption in the literature is that tacit knowledge would be more effortful and costly to share than explicit knowledge, there is a general lack of empirical work that tests this assumption.

Social exchange theory and perceived costs and benefits
Social exchange theory is a broad mode of theorizing that has many traditions in for example anthropology, economics, psychology, and sociology (Turner (1998) contains a full and thoughtful analysis of its development). For our purposes, we build on the approach developed by Blau (1964), who was most interested in exchanges among individuals in an organization. A basic principle of Blau's analysis is that social exchange is rational behavior, where people enter into social exchange because they perceive the possibility of deriving rewards. In entering an exchange relationship, each actor assumes the perspective of another and creates some perception of the other's needs. Another basic principle is that of reciprocity: all exchange operates under the assumption that people who bestow rewards or valuable resources will receive rewards in turn as payment for value received. Blau conceptualized four general classes of rewards: money, social approval, esteem or respect, and compliance. In most social relations, money is an inappropriate reward; social approval is appropriate but may not be very valuable to people; esteem is the most common reward; while being able to extract compliance in an exchange relationship is the most valuable reward. Thus, social exchange theory postulates that people interact with others based on a self-interested appraisal of the costs and benefits of such interactions. They seek to maximize their benefits and minimize their costs when exchanging resources with others (Molm, 2001). These benefits need not be tangible since individuals may engage in an interaction with the expectation of future reciprocity.

In knowledge sharing exchanges, the costs of sharing would consist of the effort and time required to make the knowledge available to another person, as well as the potential loss of relative advantage or power. Personal benefits would include obligation by others to reciprocate, heightening of self-esteem, increased self-efficacy, increased personal identification with coworkers, respect from others, reputation, and enjoyment in helping others (e.g. Bock and Kim, 2002; Bock *et al.*, 2005; Cabrera and Cabrera, 2002; Constant *et al.*, 1994; Kankanhalli *et al.*, 2005; Wasko and Faraj, 2000).

Constant *et al.* (1994) conducted an early study that applied social exchange concepts to examine factors influencing one's intention to share information as expertise (acquired from attending a computer training course) and information as product (a computer program). Their experimental results showed that first, net personal benefits perceived as a result of sharing expertise were significant motivators for sharing, and second, that although individuals may be naturally inclined to share their expertise, they were less likely to do so if the requester had previously been unhelpful. They argued that "sharing expertise, in addition to (or instead of) imposing personal costs, may produce significant personal benefits to the information provider because it permits self-expression and demonstrates self-consistency." (Constant *et al.*, 1994, p. 406)

A more recent field study by Bock and Kim (2002) surveyed employees of four large public organizations in order to discover determinants of knowledge sharing behavior. Their research model drew partially on the constructs of social exchange theory. The study found that a positive attitude toward knowledge sharing, rather than anticipation of reward, was the more significant motivational factor of knowledge exchange (Bock and Kim, 2002).

In their study of sharing and helping behaviors in online communities, Wasko and Faraj (2005, p. 39) noted that "in order to share knowledge, individuals must perceive

that sharing it would be worth the effort to others". This implies that, besides caring about their own payoffs, individuals also consider the benefits that the recipient derives. Although perceived benefits to recipients are not often examined in knowledge sharing research, a few studies did look at perceptions of helpfulness and usefulness of information shared through databases or repositories (e.g. Cress *et al.*, 2007; He and Wei, 2008; Kankanhalli *et al.*, 2005). For example, Cress *et al.* (2007), investigated whether creating awareness about the usefulness of one's knowledge to others would positively affect contributions to a shared database. The results of their experimental study support the notion that a person not only considers his or her own payoff, but also the usefulness of their knowledge to the whole collective when deciding to share knowledge.

Liang *et al.* (2008) conducted a meta-analysis of 23 journal articles and five conference papers that reported empirical results of the correlation between knowledge sharing behaviors and social exchange factors. Their analysis concluded that most constructs from social exchange theory (the study coded perceived benefit, commitment to organization, social interaction, and trust, among others) appeared to have a significant effect on individuals' knowledge sharing behaviors. In particular, the "perceived benefit" variable, which included "benefit" elements such as reputation and satisfaction, as well as "cost" elements such as perceived risk and loss of value, was found to be positively associated with an individual's knowledge sharing behavior.

Social value orientation (SVO)

Knowledge sharing belongs to a class of human decision making that takes place in situations of outcome interdependency, where decisions have reciprocal consequences for the well-being of all parties involved. While social exchange theory focuses on an individual's appraisal of the costs and benefits of an exchange, the concept of social value orientation looks at an individual's predisposition for certain outcome distributions in an exchange. Social value orientations may be defined as stable preferences for particular patterns of outcomes for oneself and others (Messick and McClintock, 1968). Thus, individuals differ systematically in the way that they approach interdependent others: some are inclined to give interdependent others the benefit of the doubt and approach them cooperatively; while others may try to maximize their own outcomes relative to others' outcomes. One typology identifies three types of social value orientation: cooperative (or prosocial); individualistic, and competitive orientations. Individuals classified as cooperative or prosocial tend to maximize outcomes for both themselves and the others and minimize the difference between these outcomes. Individualistic persons tend to maximize own outcomes regardless of that of the others. Competitive individuals tend to maximize their own outcomes seeking relative advantage over the others, i.e. maximizing the difference between outcomes (Van Lange *et al.*, 1997). Past research on social value orientation has concentrated on laboratory experiments of public good dilemma situations (e.g. Brosig, 2002; Fischbacher *et al.*, 2001; Offerman *et al.*, 1996). A recurring finding is that cooperative behaviors are more likely to be displayed by individuals identified with a cooperative social value orientation. More generally, social value orientations are found to be predictive of helping behaviors, and judgments of everyday life incidents of cooperation and competition (Van Lange *et al.*, 1997).

In knowledge sharing research, a number of studies looked at the relationship between knowledge sharing intentions and prosocial behaviors such as altruism, cooperation and helping behaviors. For example, Wasko and Faraj (2000) analyzed motivational forces that affect individuals' knowledge sharing behaviors in online communities. They found that only a very small percentage of participants (3.1 percent) contributed their knowledge for personal gains. The largest category of participants shared their knowledge because they enjoyed sharing their experiences, acted with altruism, and wanted to contribute to the betterment of community knowledge (31.3 percent).

To date, Galletta *et al.* (2003) and Marks *et al.* (2008) are the only group to have used social value orientations explicitly to analyze knowledge sharing. Galletta *et al.* (2003) considered the effect of group identification, managerial prompting, and social value orientation on knowledge sharing behavior. The authors hypothesized that cooperative individuals would contribute more valuable knowledge than those identified as individualistic or competitive. Using a decomposed game instrument, participants allocated a series of valuable points to themselves and to another person. Participants were then presented with a series of vignettes describing various knowledge sharing dilemmas. For each vignette, they chose between keeping the information for themselves and sharing it with a group member. Results showed that, as predicted, "cooperative" individuals shared on average more knowledge than "proself" individuals (which included both individualistic and competitive types).

A general finding is that individuals with a cooperative social value orientation are more likely to display helpful and sharing behaviors than individualistic and competitive individuals (e.g. Brosig, 2002; Fischbacher *et al.*, 2001; Offerman *et al.*, 1996). Our discussion of social exchange theory in the last section suggests that knowledge sharing is based on an evaluation of subjectively perceived costs and benefits. Our discussion in this section suggests that different social value orientations, acting as individual preferences for certain distributions of interdependent outcomes, would lead to different perceptions of costs and benefits in a knowledge sharing decision, and thereby influence the propensity to share knowledge indirectly.

Sharing target

Characteristics of the recipient of knowledge, also called sharing target, have received limited attention in knowledge sharing research. To date, only Ford (2004), and Ford and Staples (2006) have investigated if the sharing target affects sharing behaviors of knowledge owners. Ford (2004, p. 133) defines targets of knowledge sharing in her doctoral thesis as:

> [...] the type of entity to whom the informer is directing his/her sharing behavior, whether an individual via direct communication or the generalized other through knowledge repositories (i.e. intra-organizational mass media).

In their empirical study, Ford and Staples (2006) differentiated between three types of sharing targets: close colleagues, distant colleagues, and generalized other. Their results indicated that there were different patterns to the willingness to share across the different target types. Participants were generally willing to share knowledge with close colleagues and friends. However, individuals were less willing to share their high-valued knowledge with distant colleagues due to distrust or dislike of the distant

colleague, or the distant colleague having less perceived need for the knowledge. The authors conclude that "the target type is a very important factor, and should be included as a context factor in future research" (Ford and Staples, 2006, p.14).

In organizational settings, knowledge sharing typically takes place between individuals who occupy positions in a formal structure. Sharing targets may then be characterized by for example, their functional distance ("is he in the same unit as me") or power distance ("is she my boss"). In addition to being a close or distant colleague, the position of the target in an organizational hierarchy might be a significant factor in knowledge sharing. Sharing knowledge with a leader or supervisor to whom one reports could involve considerations different from sharing with a colleague. Leader-member exchange theory (LMX) (Dansereau *et al.*, 1975; Graen and Cashman, 1975) proposes that an interpersonal relationship develops between supervisors and subordinates against the background of a formal organization chart and a reporting obligation. The relationship is based on social exchange, wherein each party offers something valuable to the other party and each party sees the exchange as reasonably equitable. A main contribution of LMX theory is that leaders form different types of exchange relationships with their subordinates, based upon the amounts of material resources, information, and support exchanged between the two parties (Sparrowe and Liden, 1997). Furthermore, leaders, by virtue of their positions in a hierarchy, may have the power to decide how resources and opportunities might be distributed among their subordinates. Subordinates may believe that it is in their interest to maintain a good relationship with their superiors.

This study focuses on knowledge sharing situations involving three types of sharing targets: close colleague, distant colleague, and superior. A close colleague works in the same department as the informer. A distant colleague works in another department and is probably unfamiliar to the participant. A superior is the direct supervisor of the informer.

Hypotheses development

The dependent variable of interest in this study is Propensity to share knowledge. Propensity to share knowledge is defined as one's willingness or intention to share knowledge. This definition is consistent with the knowledge and information sharing literature where propensity is treated as an attitude or personal norm (Constant *et al.*, 1994; Jarvenpaa and Staples, 2000). This study views knowledge sharing as a form of social exchange, and our discussion of social exchange theory suggests that individuals share based on a rational consideration of the perceived costs and benefits associated with their sharing behaviors. These perceived costs and benefits include both tangible and intangible outcomes. Moreover, perceived benefits could include an individual's view of the benefits that the recipient would derive from the sharing behavior. This study tests two hypotheses that perceived benefit to the recipient and perceived cost to the informer are related to the propensity to share knowledge:

H1. Perceived benefit to the recipient will be positively related to Propensity to share knowledge.

H2. Perceived cost to the informer will be negatively related to Propensity to share knowledge.

Social value orientation is an individual preference for the distribution of outcomes in sharing situations. Three social value orientations were identified: cooperative, individualistic, and competitive. Each orientation is associated with a different degree of concern for one's own well-being and that of others. Cooperative individuals generally derive satisfaction from helping others and prefer fair and equal arrangements. Individualistic persons tend to maximize their own well-being only, regardless of the other. Competitive individuals tend to maximize their own interests and want to be relatively better off. This study tests two hypotheses that perceived benefit to the recipient and perceived cost to the informer will vary significantly between individuals of different social value orientations:

H3. Benefit to the recipient will be perceived differently across the three categories of Social value orientations.

H4. Cost to the informer will be perceived differently across the three categories of Social value orientations.

Finally, our discussion of the research on sharing targets indicates that propensity to share knowledge with a colleague might be affected by the functional proximity of the person, that is, whether the target is a close or distant colleague. Moreover, leader-member exchange theory implies that propensity to share knowledge with a superior might be heightened by the desire to develop high-quality leader-member relationships through the sharing of valuable resources, such as knowledge. This study tests three hypotheses on sharing targets:

H5a. Propensity to share knowledge will be significantly greater when sharing with a superior as opposed to a close colleague.

H5b. Propensity to share knowledge will be significantly greater when sharing with a superior as opposed to a distant colleague.

H5c. Propensity to share knowledge will be significantly greater when sharing with a close colleague as opposed to a distant colleague.

3. Research methods
Study population
The study population is drawn from one of the largest pension funds and institutional investors in Canada. The organization employs more than 400 professionals, and manages funds of more than 390,000 plan members with over $43 billion in net investment assets. Following a significant change in its governance structure where the plan became independent from the government, the firm recognized that, in order to continuously improve its service delivery to members and pensioners, it must change its culture to one that promotes teamwork and the sharing of knowledge amongst its employees. The strategy includes increasing social interaction among employees of all levels, organizing team building activities, implementing a firm-wide records and information management program, redesigning the work space, and relocating workgroups to be closer to each other. All 400 professional employees of the organization were invited to participate in the study; 78 employees took part in the survey, a participation rate of about 20 percent. The study sample consisted of 49 (63 percent) females and 29 (37 percent) males. A majority (55 percent) were 40 years of age

or older. Over 30 percent of the participants possessed at least an undergraduate degree (30 bachelors, 15 masters, one doctorate). In terms of years with the organization, the largest categories were six to ten years (19 percent) and three to five years (13 percent).

Data collection and measurement of variables
A questionnaire survey is the main data collection method. There are three parts to the survey. The first part measures participants' social value orientations. The second part contains six scenarios of knowledge sharing, each followed by questions that measure sharing propensity and perceived benefits and costs. The third part collects standard demographic data (i.e. age, gender, education, position, and tenure).

Social value orientations were assessed using the triple-dominance measure of social value orientations (Messick and McClintock, 1968; Van Lange *et al.*, 1997). Participants chose between three options of combinations of payoffs for oneself and another person through a series of nine decomposed games. The instructions were as shown in Figure 1.

Option A in the example represents the individualistic choice, since one's own outcomes are larger (520) than those in Option B (500) or Option C (480). Option B represents the cooperative choice because it provides a larger joint outcome $(500 + 500 = 1,000)$ than the other two options, with the smallest difference between payoffs. Finally, Option C represents the competitive choice, since the difference between payoffs to self and other is largest $(480 - 100 = 380)$. When participants selected at least six out of nine options that correspond to a particular social value orientation, they were classified as such. Permission to use a modified version of the nine-situation instrument was obtained from Van Lange *et al.* (1997). The instrument was selected because it is short, simple, easy to score, and reliable with good internal consistency (Kuhlman *et al.*, 1986).

In this part of the survey, you are presented a series of 9 decision situations. Imagine that you are paired with another person. The "other" is unknown to you. For each of the nine situations, you will have to make a decision between three options (A, B, or C). Each option allocates a certain amount of points to you and to the other person. These points are valuable, which means that the more you have the better it is for you, and the more the other has the better it is for that person as well. We expect that different individuals will have different preferences, and we are interested in knowing your preferences when making choices in decision problems. Here's an example decision situation:

In this situation, please select the points allocation option (A, B, or C) that you prefer:			
	Option A	Option B	Option C
You get	520	500	480
The other gets	260	500	100

In this example, if you choose A, you allocate 520 points to yourself and 260 points to the other; if you choose B, you allocate 500 points to yourself and 500 points to the other; if you choose C, you allocate 480 points to yourself and 100 points to the other. You can see that your choice affects both your outcome and that of the other person as well.

Figure 1.

In measuring the variables Propensity to share knowledge, Perceived benefit to recipient, Perceived cost to informer, this study applies the vignette technique. Vignettes are short hypothetical scenarios describing a social situation which contains a set of features determined by the researcher as being salient in a decision situation (Alexander and Becker, 1978). Since the features of each vignette are held constant over the study sample, researchers gain more uniformity and control over the information and assumptions brought into play by participants. This reduces the effects of a social desirability bias when respondents answer questions on each scenario.

Six scenarios were created in which participants assumed the role of knowledge owner from whom a hypothetical actor requested knowledge to be shared. Each scenario was written to reflect a different combination of sharing target and knowledge type. Three sharing targets were depicted: superior, close colleague, and distant colleague. A superior is a person to whom the participant reports directly. A close colleague is a co-worker in the same work unit or department. A distant colleague is a co-worker who is not in the same department as the participant and is most likely unknown to the participant. The scenarios were accompanied by an organization chart that showed the relationship between participant and actors. Each scenario also differed in terms of sharing explicit or tacit knowledge. Examples of sharing explicit knowledge included sharing software code, a copy of a business case, and an investment performance checklist. Examples of sharing tacit knowledge included providing tips for approaching a client, an opinion of a project's chance of success, and an overall assessment of a request for proposal.

An example scenario is below. This scenario was designed to test the effect of sharing tacit knowledge (providing tips based on experience with a client) with a close colleague (with whom one has worked for many years in same department):

> John and you have worked together for many years as sales representatives for a pharmaceutical company. A new drug has been created by your company and John was asked by his supervisor to introduce this drug to a client that is known for being difficult to make a deal with. Since you have a fair amount of experience in dealing with this client, John would like you to provide him with some tips for approaching that client in order to increase his chances to make a successful sale.

After reading each scenario, participants answered nine questions that measure Propensity to share knowledge; Perceived benefit to the recipient; Perceived cost to the informer. These questions were derived from past research, including items and scales that had been developed for these constructs. We measure Propensity to share knowledge as one's willingness or intention to share knowledge. Past research that measured this variable used questions such as "Do you intend to share?" "Would you share this information?" "Overall, what is the likelihood that you would share this information?" (Chow *et al.*, 1999; Constant *et al.*, 1994). Our questionnaire applied similar concepts of intention, likelihood, and tendency by asking participants to indicate their agreement with these statements: "My first tendency is to share this knowledge with the requester," "I do not intend to share this knowledge" (reverse coded), and "I am likely to share this knowledge with the requester." Participants used a seven-point Likert scale where $1 =$ strongly disagree, $4 =$ neither agree nor disagree, $7 =$ strongly agree.

We measure Perceived benefit to the recipient in terms of perceived helpfulness. The literature suggests that sharing knowledge may help the recipient save time, improve

results, or contribute to the generation of new ideas (Cabrera and Cabrera, 2002). The items measuring Perceived Benefit to the Recipient were adapted from Lin (2007) and Wasko and Faraj (2005), and were as follows: "This knowledge will benefit the recipient a great deal", "This knowledge will not help the recipient to perform his or her job better" (reverse coded), and "Sharing this knowledge will give the recipient an advantage." For each statement, participants indicated their agreement on a Likert scale.

Finally, we measure Perceived cost to the informer in terms of the time and effort incurred in the process of making the information or knowledge available to the requester. The literature suggests that the cost of sharing knowledge includes the time and effort required to do so, as well as the possible loss of competitive advantage or power (e.g. Lin, 2007, Kankanhalli *et al.*, 2005). We focus on the former in this study: "Sharing this knowledge is very difficult to do", "It would require a lot of effort to share this knowledge," and "I am ready to spend all the time and energy required to fully share this knowledge with the requester." Again, participants indicated their agreement with each statement on a Likert scale.

4. Data analysis and hypotheses testing
This section reports descriptive and reliability statistics for each research construct, followed by hypotheses testing results.

Social value orientations
Participants' social value orientations were assessed as described earlier using the three-choice decomposed game technique, also known as the triple-dominance measure of social values (Van Lange *et al.*, 1997). This measure has good internal consistency, test–retest reliability, and construct validity (Van Kleef and Van Lange, 2008). Table I shows the distribution of social value orientations by gender.

Of the 78 individuals who completed the survey questionnaire, 68 were identified with a predominant social value orientation. A total of 39 participants were identified as cooperative individuals, 20 as individualistic, and nine as competitive. The remaining ten individuals could not be classified because they did not make at least six choices consistent with one of the social value orientations. In both the cooperative and competitive categories, the majority of candidates consisted of females (cooperative = 26; competitive = 8). However, of the individuals classified as individualistic, 12 were males and eight were females. The internal consistency reliability scores for social value orientations in this study are very good (cooperative, Cronbach's $\alpha = 0.9551$; individualistic, $\alpha = 0.9315$; competitive, $\alpha = 0.9575$).

| | Social value orientation category | | | | | |
| | Cooperative | | Individualistic | | Competitive | |
	Frequency	%	Frequency	%	Frequency	%
Male	13	19.1	12	17.6	1	1.5
Female	26	38.2	8	11.8	8	11.8
Total	39	57.4	20	29.4	9	13.2

Note: $n = 68$

Table I.
Distribution of social value orientations

Propensity to share knowledge is the dependent variable and is measured by participants' responses to these statements: "My first tendency is to share this knowledge with the requester," "I do not intend to share this knowledge" (reverse coded), and "I am likely to share this knowledge with the requester." Table II shows descriptive statistics for the propensity to share knowledge variable in each scenario (1 = strongly disagree, 4 = neither agree nor disagree; 7 = strongly agree). Internal consistency of these items is very good (Cronbach's $\alpha = 0.8429$). To create an overall score for the variable, numerical responses to the three items were averaged in each scenario. As there were six scenarios, each participant had six scores for this variable.

The Perceived benefit to recipient variable is estimated with three survey items: "This knowledge will benefit the recipient a great deal," "This knowledge will not help the recipient to perform his or her job better" (reverse coded), and "Sharing this knowledge will give the recipient an advantage." ($\alpha = 0.7222$) Table III presents the descriptive statistics for the Perceived benefit to recipient variable ((1 = strongly disagree, 4 = neither agree nor disagree; 7 = strongly agree). To create a score for this variable, numerical responses to the three items were averaged in each scenario. As there were six scenarios, each participant had six scores for this variable.

The Perceived cost to informer variable refers to the amount of time and effort required to share knowledge with a given requester in each scenario. It was measured with three items: "Sharing this knowledge is very difficult to do," "It would require a lot of effort to share this knowledge," and "I am ready to spend all the time and energy required to fully share this knowledge with the requester." Table IV shows descriptive statistics for the Perceived cost variable (1 = strongly disagree, 4 = neither agree nor disagree; 7 = strongly agree). To create a score for this variable, numerical responses to the three items were averaged in each scenario. As there were six scenarios, each participant had six scores for this variable.

Cronbach's α for this construct is relatively low at 0.6552, but may be regarded as minimally acceptable (DeVellis, 1991). Since this research hypothesizes that Social

Scenario with ...	Minimum	Maximum	Median	Mean	SD	n
Distant colleague 1	1	7	6	5.32	1.48	78
Distant colleague 2	3	7	6	5.78	1.22	78
Close colleague 1	1	7	6	5.58	1.39	78
Close colleague 2	1	7	6	5.80	1.36	78
Superior 1	1	7	6	6	1.29	78
Superior 2	1	7	6	6.09	1.16	78

Table II.
Propensity to share knowledge – descriptive statistics

Scenario with ...	Minimum	Maximum	Median	Mean	SD	n
Distant colleague 1	1	7	6	5.86	1.22	78
Distant colleague 2	2	7	6	5.68	1.16	78
Close colleague 1	1	7	6	5.81	1.21	78
Close colleague 2	2	7	6	6.09	0.97	78
Superior 1	3	7	6	5.90	1.03	78
Superior 2	2	7	6	5.58	1.22	78

Table III.
Perceived benefit to recipient – descriptive statistics

value orientations will predict differences in Perceived cost, the coefficients were calculated separately for each SVO category. Interestingly, the cooperative group is the only one with a reliability coefficient below 0.70 (cooperative, $\alpha = 0.6509$; individualistic, $\alpha = 0.7106$; competitive, $\alpha = 0.7523$). Therefore, it is acceptable that the Perceived cost variable remains in the analysis.

Hypotheses testing

H1 states that "Perceived benefit to the recipient will be positively related to Propensity to share knowledge." In other words, are individuals more likely to share knowledge when they believe doing so would be beneficial to the recipient? Correlational analysis examines the magnitude of association between Propensity to share knowledge and Perceived benefit to the recipient. Spearman's rho is used since the data is ordinal and non-normally distributed. The correlation coefficient is 0.3775 ($p < .0001$), indicating a positive and moderate association between the two variables.

Ordinal logistic regression is then used to provide a more accurate analysis of the association between Propensity to share knowledge and Perceived benefit to the recipient. We apply ordinal logistic regression instead of linear regression because responses on a Likert scale represent ordinal data rather than interval data. On a Likert scale, we cannot assume that all differences between two consecutive intervals are equal: the difference between a "strongly agree" response and "agree" response may not be the same as the difference between an "agree" response and "neither agree nor disagree" response. Thus, using ordinal logistic regression that treats Likert-scale data as ordinal is more appropriate than using linear regression that assumes the data to be interval (Daykin and Moffatt, 2002).

In this study, the ordinal logistic model takes the following form:

$$\ln(\theta_j) = \alpha_j - \beta_1*PBR - \beta_2*PCI - \beta_3*ST - \beta_4*SVO \tag{1}$$

where:

PBR = Perceived benefit to recipient;

PCI = Perceived cost to informer;

ST = sharing target; and

SVO = social value orientation.

j goes from 1 to the number of categories in the dependent variable (in this case 7) minus 1 and $\beta_1, \beta_2, \ldots \beta_4$ are the regression coefficients for the predictor variables to

Scenario with...	Minimum	Maximum	Median	Mean	SD	*n*
Distant colleague 1	1	7	4	3.45	1.55	78
Distant colleague 2	1	7	3	2.90	1.29	78
Close colleague 1	1	7	3	2.99	1.37	78
Close colleague 2	1	7	3	2.86	1.39	78
Superior 1	1	7	2	2.47	1.39	78
Superior 2	1	6	3	2.87	1.23	78

Table IV.
Perceived cost to informer – descriptive statistics

be estimated. is called a logit where represents the odds of observing level j in the dependent variable. All of the odds are calculated as follows:

$$\theta_j = p(PSK \leq j)/p(PSK > j) \tag{2}$$

where PSK is the dependent variable Propensity to share knowledge. For instance, the odds of observing the response "agree" (level 6 on a Likert scale) to the statements estimating Propensity to share knowledge is:

$$\theta_6 = p(PSK \leq 6)/p(PSK > 6). \tag{3}$$

Although multiple odds are calculated, ordered logistic regression analysis generates a single coefficient estimate for each independent variable using the maximum-likelihood method under the assumption of equality of coefficients across response categories.

Table V shows results of the ordered logistic regression of Propensity to share knowledge on Perceived benefit to the recipient and other independent variables. The table shows the dependent and independent variables in the model, the regression coefficient for Perceived benefit to the recipient, the Pseudo R^2, the Chi^2 value for the likelihood ratio (LR) test, the Chi^2 value for the test of equality of coefficients across response categories, and the sample size.

The small p-value, <0.0001, of the LR test statistic indicates strong overall significance of the regression of Propensity to share knowledge on Perceived benefit to the recipient and other independent variables. Moreover, the equality assumption in ordered logistic regression is not violated indicating that the data fits the model well. Pseudo R^2 is a model selection criterion that measures the effect size of a model –a higher pseudo R^2 indicates that the model predicts outcome better. Values in the 0.2 to 0.4 range are considered highly satisfactory (Hensher and Johnson, 1980). The regression coefficient of Perceived benefit to recipient is 0.5493 and is significant at 0.001 level. Perceptions of the benefit to the recipient from sharing knowledge seem to increase one's propensity to share knowledge. A unit increase in Perceived benefit to recipient increases the odds of displaying a higher Propensity to share knowledge by 0.5493, holding everything else constant.

H1 is supported by results of the analysis. Correlational analysis suggests a moderate positive relationship between Propensity to share knowledge and Perceived

Dependent variable	Independent variables	Regression coefficient (β)	Pseudo R^2	Likelihood ratio (LR) Chi^2	Chi^2 value for equality assumption	n
Propensity to share knowledge	Perceived benefit to recipient, Perceived cost, Sharing target, Social value orientation, Age, Gender, Education, Level in organization	0.5493*	0.2692	332.13**	48.44	68

Notes: *$p < 0.001$; **$p < 0.0001$ (full regression results are in the Appendix, Table AI)

Table V. Ordered logit regression of propensity to share knowledge on perceived benefit to recipient and other independent variables

benefit to the recipient, whereas the ordered logistic regression analysis indicates a strong positive relationship between the two variables.

H2 states that "Perceived cost to the informer will be negatively related to Propensity to share knowledge." Again Spearman's rho is chosen for the correlational analysis since both variables are ordinal and non-normally distributed. The value of the correlation coefficient is -0.6744 ($p < 0.0001$), indicating a negative and strong association between the variables. Ordinal logistic regression is used to analyze in more detail the association between Propensity to share knowledge and Perceived cost to informer where other independent variables are also included in the model. The ordinal logistic model takes the same form as the one described in *H1* (see equations (1)-(3)). Table VI shows results of the ordered logistic regression of Propensity to share knowledge on Perceived cost to informer and other independent variables.

The small p-value, below 0.0001, of the LR test statistic indicates strong overall significance of the regression of Propensity to share knowledge on Perceived cost and other independent variables. Moreover, the equality assumption in ordered logistic regression is not violated indicating that the data fits the model well. The regression coefficient for Perceived cost from sharing knowledge is -1.2465. This is significant at the 0.001 level. The effect of the variable is in the expected direction.

H2 is supported by the results of the analysis. Correlational analysis suggests a strong negative relationship between Perceived cost to informer and Propensity to share knowledge. Ordered logistic regression analysis shows that Perceived cost has a negative relationship with the odds of demonstrating higher levels of Propensity to share knowledge.

H3 states that "Benefit to the recipient will be perceived differently across the three categories of Social value orientations." Perceived benefit to recipient was measured by three questions on a seven-point Likert scale and the data are therefore ordinal. Social value orientations were assessed using the three-choice decomposed game technique resulting in categorical data. Non-parametric tests for differences between groups are used to test this hypothesis. A Kruskal-Wallis equality-of-populations rank test is used to compare Perceived Benefit to Recipient scores across the three social value orientation groups. Next, Wilcoxon rank sum tests are conducted for an analysis by pairs of social value orientation.

Since the Kruskal-Wallis test is distribution-free, it is preferred as an alternative to the ANOVA method for testing independent groups because the data is non-normally

Dependent variable	Independent variables	Regression coefficient (β)	Pseudo R^2	Likelihood ratio (LR) Chi^2	Chi^2 value for equality assumption	n
Propensity to share knowledge	Perceived cost to informer, Perceived benefit to recipient, Sharing target, Social value orientation, Age, Gender, Education, Level in organization	-1.2465^*	0.2692	332.13^{**}	48.44	68

Table VI.
Ordered logit regression of propensity to share knowledge on perceived cost to informer and other independent variables

Notes: $^*p < 0.001$; $^{**}p < 0.0001$ (full regression results are in the Appendix, Table AI)

distributed. The test results indicate that, overall, there is no significant difference between Perceived benefit to recipient across the three social value orientation groups (Chi^2 = 3.01; $p > 0.05$).

We then compared Perceived benefit to recipient by social value orientations according to different levels of Propensity to share knowledge. For a given level of self-reported Propensity to share knowledge, individuals with different value orientations might perceive the benefit to the recipient differently. Table VII shows results of the Kruskal-Wallis tests comparing Perceived benefit to recipient by social value orientations for each level of Propensity to share knowledge.

The results show that there is a significant difference in the Perceived benefit to recipient scores across the three social value orientation (SVO) groups when the sample is limited to participants whose Propensity to share knowledge response is seven (the highest level). To see where the differences indicated in the Kruskal-Wallis tests lie, we analyze Perceived benefit to the recipient by pair of SVOs using Wilcoxon rank sum tests. Table VIII shows results of the Wilcoxon rank sum tests by pair of SVOs when Propensity to share knowledge is seven.

The results in Table VIII indicate that there is a significant difference in the Perceived benefit to recipient between the cooperative and competitive groups where the competitive group scores higher. Competitive individuals also reported higher levels of Perceived benefit to recipient relative to individualistic participants. In other words, within the instances where Propensity to share knowledge was at the highest level, competitive individuals perceived the benefit to the recipient significantly higher than cooperative and individualistic participants.

Level of propensity to share knowledge	Chi^2 value	Observations
1	2.99[*]	8
2	0.167	4
3	0.082	15
4	0.635	47
5	3.244	67
6	0.111	112
7	10.861[**]	155

Notes: [*]$p < 0.10$; [**]$p < 0.01$; since there is one propensity score from each of the six scenarios for every participant, the number of observations represents the number of instances a given propensity score was reported. The number of respondents is 68 when restricted to those with an identifiable SVO

Table VII.
Kruskal-Wallis tests for comparing perceived benefit to recipient by SVO for each level of propensity to share knowledge

SVO compared	Z score	Observations
Cooperative vs Individualistic	0.059	135
Cooperative vs Competitive	3.083[*]	118
Individualistic vs Competitive	3.410[**]	57

Notes: [*]$p < 0.001$; [**]$p < 0.0001$; since there is one perceived benefit score from each of the six scenarios for every participant, the number of observations represents the number of instances the given perceived benefit score was reported. The number of respondents is 68 when restricted to those with an identifiable SVO

Table VIII.
Wilcoxon rank sum tests for comparing perceived benefit to recipient by pairs of SVO when propensity to share knowledge = 7

H3 is partially supported by the results of the analysis. There is no statistically significant difference in Perceived benefit to recipient across the three categories of social value orientations. However, there is a significant difference in Perceived benefit to recipient between competitive individuals and the two other groups when the analysis is restricted to responses with the highest level of Propensity to share knowledge.

H4 states that "Costs to the informer will be perceived differently across the three categories of social value orientations." Again, a Kruskal-Wallis equality-of-populations rank test is used to compare the Perceived Cost to Informer across the three social value orientation groups. Next, three Wilcoxon rank sum tests are conducted for a pairwise analysis by social value orientations.

The results of the Kruskal-Wallis test (Table IX) indicate that there is a significant difference in Perceived Costs across the different Social Value Orientations ($Chi^2 = 6.316$; $p < 0.05$). This suggests that overall, at least one SVO group perceived the cost associated with sharing knowledge significantly differently from the other groups. A series of pairwise Wilcoxon rank sum tests is then conducted in order to determine where the difference(s) lie (Table X).

Table X shows that participants identified with an individualistic value orientation perceived the costs of sharing knowledge significantly higher than participants identified with a cooperative value orientation ($p < 0.05$). Social value orientations appear to play a role in the perceptions of costs associated with sharing knowledge. No significant differences were found when comparing Perceived cost to the informer between cooperative and competitive individuals and between individualistic and competitive individuals.

H4 is supported by the results of the analysis. The Kruskal-Wallis test found a significant difference in Perceived cost to the informer across the categories of social value orientation and a series of pairwise Wilcoxon rank sum tests by social value orientations revealed that participants identified as individualistic perceived the costs from sharing knowledge to be higher compared to cooperative individuals.

Chi^2 value	Observations
6.316[*]	408

Notes: [*]$p < 0.05$; since there is one perceived cost score from each of the six scenarios for every participant, the number of observations represents the number of instances a given perceived cost score was reported. The number of respondents is 68 when restricted to those with an identifiable SVO

Table IX.
Kruskal-Wallis test for comparing perceived cost to informer by SVO

SVO compared	Z score	Observations
Cooperative vs Individualistic	2.519[*]	354
Cooperative vs Competitive	0.717	288
Individualistic vs Competitive	−1.031	174

Notes: [*]$p < 0.05$; since there is one perceived cost score from each of the six scenarios for every participant, the number of observations represents the combined number of instances perceived cost have been reported. The number of respondents is 68 when restricted to those with an identifiable SVO

Table X.
Wilcoxon rank sum tests for comparing perceived cost to informer by pairs of SVO

H5 is concerned with the relationship between Propensity to share knowledge and Sharing targets. This hypothesis is elaborated into three sub-hypotheses:

H5a. "Propensity to share knowledge will be significantly greater when sharing with a superior as opposed to a close colleague."

H5b. "Propensity to share knowledge will be significantly greater when sharing with a superior as opposed to a distant colleague."

H5c. "Propensity to share knowledge will be significantly greater when sharing with a close colleague as opposed to a distant colleague."

Each hypothesis was tested using a Wilcoxon rank sum test. Table XI shows each hypothesis and the corresponding pair of Sharing targets being compared, the *Z* scores, and the number of observations.

The results in Table XI support *H5a* and *H5b*. They show that participants were significantly more likely to share knowledge when the recipient was identified as their superior as opposed to a close colleague. Participants were also significantly more likely to share knowledge when the recipient was identified as their superior as opposed to a distant colleague. No difference in Propensity to share knowledge was found between sharing with a close colleague and a distant colleague. Clearly, when the requester of knowledge is the informer's superior, the informer's willingness to share is increased.

As an addendum, our data analysis revealed no significant difference in perceived costs between sharing explicit knowledge and tacit knowledge. This is contrary to the expectation that explicit knowledge would require less effort to share than tacit knowledge. We plan to report these and other findings in another paper, but for now, we note briefly that when answering questions following each sharing scenario, participants could have made different assumptions about the scope of effort needed to share the knowledge, and the amount of risk and trust that is involved in the exchange.

5. Summary and discussion of results

This exploratory study examined knowledge sharing behavior as being subject to three sets of influences: a rational calculus that weighs the costs and benefits of sharing; a dispositional preference that favors certain patterns of sharing outcomes; and a relational effect based on working relationships. We found that both perceived costs and perceived recipient benefits had a clear effect on sharing. Notably, we found that propensity to share knowledge is positively related to perceived benefit to the recipient, suggesting that evaluation of cost and benefit is not limited to self-interest, but is also influenced by perceived recipient benefit. While we may expect that

Hypothesis	Pair of sharing targets	Z score	Observations
H5a	Superior vs Close colleague	-2.621^{*}	312
H5b	Superior vs Distant colleague	-3.537^{**}	312
H5c	Close colleague vs Distant colleague	-0.974	312

Notes: $^{*}p < 0.001$; $^{**}p < 0.0001$; since there is one propensity to share score from each of the six scenarios for every participant, the number of observations represents the combined number of instances propensity to share have been reported. The total number of respondents is 78

Table XI. Wilcoxon rank sum tests for comparing propensity to share knowledge by pairs of sharing targets

differences in perceived costs and benefits would be due to differences in the individual's social value orientation, the data showed partial support for this relationship. The study also found that relationship with the sharing target influenced sharing. Interestingly, the propensity to share with a superior was higher than that with a close or distant colleague.

Consistent with past research that analyzed knowledge sharing behavior using social exchange theory, this study found that perceived costs and benefits are both significantly related to knowledge sharing propensity. In social exchange theory, the conceptualization of cost and benefit is deliberately broad: gains and losses may be tangible or intangible; short term or long term; intrinsic or extrinsic. A noteworthy result of this study is that an individual's perception of the benefit of the shared knowledge to the recipient is positively related to the individual's propensity to share that knowledge. While benefits to the informer (reputation, respect, reciprocation) are often examined, far fewer studies look at the benefit that accrues to the recipient of the knowledge. This study suggests that the rational evaluation of cost and benefit in social exchange is not limited to self-interest and self-gain, but is also strongly influenced by perceived recipient benefit. A recent experimental study by Cress et al. (2007) found that "prospective metaknowledge," or knowledge about the importance of one's own information to others, was a significant factor that enhanced the quality and quantity of contributions to a shared database. Based on these findings, organizations may wish to consider ways to increase awareness among their employees about the value of their knowledge to others. More generally, social exchange theory seems to be a useful conceptual approach for studying knowledge sharing behavior. Hall (2003) reviewed knowledge-sharing literature related to social exchange theory, and concluded that past studies indicate clearly that social exchange is an important driver of knowledge sharing. She expected ongoing research in this area to continue to expand our understanding of knowledge sharing.

Having identified the role of perceived benefit to recipient, the study then went on to test if this perceived benefit varied across different categories of social value orientation (SVO). Initial analysis indicated that there was no significant difference. However, by limiting analysis to the highest level of propensity to share knowledge, we found that individuals with a competitive value orientation were more likely to perceive recipient benefit more highly than those with a cooperative or an individualistic value orientation. With regard to perceived cost of sharing to the informer, the results were clear-cut: individualistic persons perceived sharing costs to be higher than cooperative persons. In the full regression model (Appendix, Table AI), the three categories of SVO do not show significant effects on the propensity to share knowledge. The lack of explanatory power of SVO in this study may be due, in part, to a deficiency in the research design. The study does not measure perceived benefit to the informer of sharing knowledge: it only measures perceived benefit to the recipient. Since SVO indicates the extent of concern for both outcome to self and outcome to other, analysis using perceived benefit to recipient alone may not provide sufficient information for observing differences among different SVO types.

A unique feature of this study is in comparing sharing behavior with different sharing targets. Results showed that individuals were significantly more likely to share knowledge with their superior than with a close colleague or a distant colleague. No significant difference in propensity was found between sharing knowledge with a close

colleague and a distant colleague. Our earlier discussion of leader-member exchange theory suggests that in superior-subordinate relationships, there may be a particular motivation to exchange valued resources, such as knowledge, in order to increase the mutual benefits derived from these exchanges and so improve the quality of the relationship. Low-quality leader-member relations have been characterized in terms of economic (contractual) exchanges that do not progress beyond what is specified in the employment agreement, whereas high-quality leader-member relations have been characterized in terms of social exchanges that extend beyond what is required of the employment contract (Sparrowe and Liden, 1997, p. 523). The greater the perceived value of the resources exchanged, the higher the quality of the leader-member exchange relationship. Thus, knowledge sharing may be seen as a social exchange of valuable resource that may be pursued to enhance leader-member relationship.

An overarching theme of this study has been that knowledge sharing is volitional and cannot be forced or mandated. (While organizations may decree that employees share their knowledge, reluctant employees have always found ways to circumvent or undermine the spirit of such directives.) We discovered that individual perceptions about costs and benefits, personal preferences about the distribution of sharing outcomes, and the structural relationship of knowledge recipients, all have effects on knowledge sharing behavior. At the same time, the limitations of this exploratory study are self-evident: a single study organization; small group of participants; limited number of variables. Much more remains to be learned, and we hope that the conceptual frames and methodological innovations introduced in this study might, in some small way, stimulate new ideas for further research on an important topic.

References

Alexander, C.S. and Becker, H.J. (1978), "The use of vignettes in survey research", *The Public Opinion Quarterly*, Vol. 42 No. 1, pp. 93-104.

Blau, P.M. (1964), *Exchange and Power in Social Life*, Wiley, New York, NY.

Bock, G.-W. and Kim, Y.-G. (2002), "Breaking the myth of rewards: an exploratory study of attitudes about knowledge sharing", *Information Resources Management Journal*, Vol. 15 No. 2, pp. 14-21.

Bock, G.-W., Zmud, R.W., Kim, Y.-G. and Lee, J.-N. (2005), "Behavioral intention formulation in knowledge sharing: examining the roles of extrinsic motivators, social-psychological forces, and organizational climate", *MIS Quarterly*, Vol. 29 No. 1, pp. 87-111.

Brosig, J. (2002), "Identifying cooperative behavior: some experimental results in a prisoner's dilemma game", *Journal of Economic Behavior & Organization*, Vol. 47 No. 3, pp. 275-90.

Cabrera, A. and Cabrera, E.F. (2002), "Knowledge-sharing dilemmas", *Organization Studies*, Vol. 23 No. 5, pp. 687-710.

Chow, C., Harrison, J., McKinnon, J. and Wu, A. (1999), "Cultural influences on informal information sharing in Chinese and Anglo-American organizations: an exploratory study", *Accounting, Organizations and Society*, Vol. 24 No. 7, pp. 561-82.

Constant, D., Kiesler, S. and Sproull, L. (1994), "What's mine is ours, or is it? A study of attitudes about information sharing", *Information Systems Research*, Vol. 5 No. 4, pp. 400-21.

Cress, U., Barquero, B., Schwan, S. and Hesse, F.W. (2007), "Improving quantity and quality of contributions: two models for promoting knowledge exchange with shared databases", *Computers & Education*, Vol. 49 No. 2, pp. 423-40.

Dansereau, F. Jr, Graen, G. and Haga, W.J. (1975), "A vertical dyad linkage approach to leadership within formal organizations: a longitudinal investigation of the role making process", *Organizational Behavior and Human Performance*, Vol. 13 No. 1, pp. 46-78.

Daykin, A.R. and Moffatt, P.G. (2002), "Analyzing ordered responses: a review of the ordered Probit model", *Understanding Statistics*, Vol. 1 No. 3, pp. 157-66.

DeVellis, R.F. (1991), *Scale Development: Theory and Applications*, Sage, Newbury Park, CA.

Fischbacher, U., Gächter, S. and Fehr, E. (2001), "Are people conditionally cooperative? Evidence from a public goods experiment", *Economics Letters*, Vol. 71 No. 3, pp. 397-404.

Ford, D. (2004), "Knowledge sharing: seeking to understand intentions and actual sharing", unpublished doctoral thesis, Queen's University, Kingston.

Ford, D. and Staples, D.S. (2006), "Perceived value of knowledge: the potential informer's perception", *Knowledge Management Research & Practice*, Vol. 4 No. 1, pp. 3-16.

Galletta, D., Marks, P., McCoy, S. and Polak, P. (2003), "What leads us to share valuable knowledge? An experimental study of the effects of managerial control, group identification, and social value orientation on knowledge-sharing behavior", *Proceedings of 36th Annual Hawaii International Conference on Systems Sciences (CD/ROM), January 6-9, 2003*, Computer Society Press, New York, NY.

Graen, G. and Cashman, J.F. (1975), "A role making model of leadership in formal organizations: a developmental approach", in Hunt, J.G. and Larson, L.L. (Eds), *Leadership Frontiers*, Kent State University Press, Kent, OH.

Hall, H. (2003), "Borrowed theory: applying exchange theories in information science research", *Library and Information Science Research*, Vol. 25 No. 3, pp. 287-306.

He, W. and Wei, K.W. (2008), "What drives continued knowledge sharing? An investigation of knowledge contribution and seeking beliefs", *Decision Support Systems*, Vol. 46 No. 4, pp. 826-38.

Hensher, D.A. and Johnson, L.W. (1980), *Applied Discrete-choice Modelling*, Croom Helm, London.

Jarvenpaa, S.L. and Staples, D.S. (2000), "The use of collaborative electronic media for information sharing: an exploratory study of determinants", *Journal of Strategic Information Systems*, Vol. 9 Nos 2-3, pp. 129-54.

Kankanhalli, A.C.Y., Tan, B. and Wei, K.K. (2005), "Contributing knowledge to electronic knowledge repositories: an empirical investigation", *MIS Quarterly*, Vol. 29 No. 1, pp. 113-43.

Kuhlman, D.M., Camac, C. and Cunha, D.A. (1986), "Individual differences in social orientation", in Wilke, H., Messick, D. and Rutte, C. (Eds), *Experimental Social Dilemmas*, Verlag Peter Lang, New York, NY, pp. 151-76.

Liang, T.-P., Liu, C.-C. and Wu, C.-H. (2008), "Can social exchange theory explain individual knowledge-sharing behavior? A meta-analysis", *International Conference on Information Systems (ICIS) 2008 Proceedings*, paper 171, available at: http://aisel.aisnet.org/icis2008/171 (accessed July 17, 2009).

Lin, L.H. (2007), "Effects of extrinsic and intrinsic motivation on employee knowledge sharing intentions", *Journal of Information Science*, Vol. 33 No. 2, pp. 135-49.

Marks, P.V., Polak, P., McCoy, S. and Galletta, D.F. (2008), "Sharing knowledge: how managerial prompting, group identification, and social value orientation affect knowledge-sharing behavior", *Communications of the ACM*, Vol. 51 No. 2, pp. 60-5.

Messick, D.M. and McClintock, C.G. (1968), "Motivational bases of choice in experimental games", *Journal of Experimental Social Psychology*, Vol. 4 No. 1, pp. 1-25.

Molm, L.D. (2001), "Theories of social exchange and exchange networks", in Ritzer, G. and Smart, B. (Eds), *Handbook of Social Theory*, Sage Publishers, London, pp. 260-72.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Offerman, T., Sonnemans, J. and Schram, A. (1996), "Value orientations, expectations and voluntary contributions in public goods", *The Economic Journal*, Vol. 106 No. 437, pp. 817-45.

Oliver, G. (2008), "Information culture: exploration of differing values and attitudes to information in organisations", *Journal of Documentation*, Vol. 64 No. 3, pp. 363-85.

Polanyi, M. (1962), *Personal Knowledge Towards a Post-critical Philosophy*, University of Chicago Press, Chicago, IL.

Sparrowe, R.T. and Liden, R.C. (1997), "Process and structure in leader-member exchange", *Academy of Management Review*, Vol. 22 No. 2, pp. 522-52.

Turner, J.H. (1998), *The Structure of Sociological Theory*, 6th ed., Wadsworth, Belmont, CA.

Van Kleef, G.A. and Van Lange, P.A.M. (2008), "What other's disappointment may do to selfish people: emotion and social value orientation in a negotiation context", *Personality and Social Psychology Bulletin*, Vol. 34 No. 8, pp. 1084-95.

Van Lange, P.A.M., Otten, W., Bruin, E.M.N.D. and Joireman, J.A. (1997), "Development of prosocial, individualistic, and competitive orientations: theory and preliminary evidence", *Journal of Personality and Social Psychology*, Vol. 73 No. 4, pp. 733-46.

Wasko, M.M. and Faraj, S. (2000), "'It is what one does': why people participate and help others in electronic communities of practice", *Journal of Strategic Information Systems*, Vol. 9 Nos 2-3, pp. 155-73.

Wasko, M.M. and Faraj, S. (2005), "Why should I share? Examining social capital and knowledge contribution in electronic networks of practice", *MIS Quarterly*, Vol. 29 No. 1, pp. 35-57.

Weiss, L. (1999), "Collection and connection: the anatomy of knowledge sharing in professional service firms", *Organizational Development Journal*, Vol. 17 No. 4, pp. 61-77.

Widén-Wulff, G. and Ginman, M. (2004), "Explaining knowledge sharing in organizations through the dimensions of social capital", *Journal of Information Science*, Vol. 30 No. 5, pp. 448-58.

Further reading

Berk, L. (2000), *Child Development*, 5th ed., Allyn and Bacon, Boston, MA.

Brief, A.P. and Motowidlo, S.J. (1986), "Prosocial organizational behaviors", *Academy of Management Review*, Vol. 11 No. 4, pp. 710-25.

Connelly, C.E. and Kelloway, E.K. (2003), "Predictors of employees' perceptions of knowledge sharing cultures", *Leadership & Organization Development Journal*, Vol. 24 No. 5, pp. 294-301.

DeVellis, R.F. (2003), *Scale Development: Theory and Applications*, 2nd ed., Sage Publications, Newbury Park, CA.

Graen, G.B. and Scandura, T.A. (1987), "Toward a psychology of dyadic organizing", in Staw, B.M. and Cummings, L.L. (Eds), *Research in Organizational Behavior*, JAI Press, Greenwich, CT, pp. 175-208.

Kelloway, E.K. and Barling, J. (2000), "Knowledge work as organizational behaviour", *International Journal of Management Reviews*, Vol. 2 No. 3, pp. 287-304.

Lin, L.H., Geng, X.J. and Whinston, A.B. (2005), "A sender-receiver framework for knowledge transfer", *MIS Quarterly*, Vol. 29 No. 2, pp. 197-219.

Van Lange, P.A.M. and Kuhlman, D.M. (1994), "Social value orientations and impressions of partner's honesty and intelligence: a test of the might versus morality effect", *Journal of Personality and Social Psychology*, Vol. 67 No. 1, pp. 126-41.

Appendix

Dependent variable	Independent variables	Regression coefficient (β)	Pseudo R^2	Likelihood ratio (LR) Chi^2	Chi^2 value for equality assumption	n
Propensity to share knowledge	Perceived benefit to recipient	0.5493***	0.2692	332.13****	48.44	68
	Perceived cost to informer	$-$1.2465***				
	Knowledge type	$-$0.3501				
	Sharing target	0.3182**				
	Cooperative SVO	0.1722				
	Individualistic SVO	0.2865				
	Competitive SVO	$-$0.1253				
	Age	0.1162*				
	Gender	$-$0.2629				
	Education	0.2601****				
	Level in organization	$-$0.0047				

Notes: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; $^{****}p < 0.0001$; SVO: social value orientation

Table AI.
Ordered logit regression of propensity to share knowledge: full regression results

Corresponding author
Chun Wei Choo can be contacted at: cw.choo@utoronto.ca