A MODEL OF KNOWLEDGE-SHARING MOTIVATION

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In this article, I present a model of knowledge-sharing motivation based on a combination of the theory of planned behavior (TPB) and self-determination theory (SDT), along with a review of research supporting the model and suggestions for future research and methodologies to study knowledge-sharing behavior. I also give suggestions for designing five important human resource management (HRM) practices, including staffing, job design, performance and compensation systems, managerial styles, and training.

Keywords: knowledge sharing, work motivation, theory of planned behavior, self-determination theory

Organizations' competitive advantage increasingly depends on effective knowledge management and organizational learning (Riege, 2005). Successfully implementing knowledge management systems depends on employee behavior (Park, Ribiere, & Schulte, 2004), especially on knowledge sharing among employees. This paper proposes a process model of knowledge-sharing motivation based on the combination of two prominent theories of motivation: the theory of planned behavior, or TPB (Ajzen, 1991), and self-determination theory, or SDT (Deci & Ryan, 1985, 2000). Previous models of knowledge-sharing motivation discuss motivation only in terms of level or amount. SDT proposes that motivation varies not only in terms of level, but also in terms of quality. Autonomous motivation has been shown to lead to better behavioral and attitudinal outcomes than controlled motivation (Gagné & Deci, 2005). The proposed model therefore builds on previous knowledge-sharing motivation models by taking into account the motivation quality. This new model will likely foster new research that more precisely predicts engagement in knowledge-sharing behavior and potentially yields more successful interventions aimed at increasing knowledge sharing in organizations.

Knowledge Sharing

The study of knowledge in organizations has included studies on the nature of knowledge

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and on the process of knowledge sharing (Ipe, 2003). Knowledge is defined as "a fluid mix of framed experience, values, contextual information, and expert insights" (Davenport & Prusak, 1998, p. 5). Knowledge sharing is the process of mutually exchanging knowledge and jointly creating new knowledge (van den Hooff & de Ridder, 2004); it implies synergistic collaboration of individuals who work toward a common goal (Boland & Tenkasi, 1995). As I will discuss in greater length, it is often assumed that knowledge-sharing behavior shares similarities with many other voluntary behaviors, such as helping and prosocial behaviors and organizational citizenship behaviors (Frey, 1993). For this reason, we need to use a motivation theory that has proven useful in predicting such behaviors. As I will review, SDT (Deci & Ryan, 1985, 2000) has proven to be such a theory.

Empirical research has identified important factors that influence knowledge sharing, including individual factors (e.g., lack of trust, fear of loss of power, and lack of social network), organizational factors (e.g., lack of leadership, lack of appropriate reward system, and lack of sharing opportunities), and technological factors (e.g., inappropriate information technology [IT] systems and lack of training; Riege, 2005). In addition, the nature of the knowledge will influence how easily it can be shared, and its value will influence people's motivation to share (Ipe, 2003). The ease of sharing also is likely to influence people's willingness to share. This is consistent with research on recycling behavior and IT usage, which has shown that the harder the task, the more important is the quality of motivation (Green-Demers, Pelletier, & Ménard, 1997; Mitchell, Gagné, Beaudry, & Dyer, 2008). Knowledge value implies that individuals can use it to obtain status, power, and rewards. So far, researchers have studied knowledge-sharing motivation as a function of reciprocity issues, relationship with the recipient, and rewards (Ipe, 2003). Reciprocity implies that individuals must see knowledge sharing as personally worthwhile or important for reaching a valued collective goal in order to be willing and eager to share (de Vries, van den Hooff, & de Ridder, 2006). Focusing on group and long-term outcomes encourages cooperation (Pruitt & Kimmel, 1977) and knowledge sharing. Other research has examined whether individuals are more likely to share knowledge when they can obtain rewards in return (O'Reilly & Pondy, 1980). On the one hand, group-based incentives have been shown to encourage sharing (Gupta & Govindajaran, 2000), but some researchers argue that tangible rewards are insufficient and could even be detrimental to the motivation to share (McDermott & O'Dell, 2001; O'Dell & Grayson, 1998; Tissen, Andriessen, & Deprez, 1998).

Researchers argue that tangible rewards are insufficient and could even be detrimental to the motivation to share.

The motivational factors Ipe (2003) mentions to study knowledge sharing mostly fall under the category of controlled motivation, which leads to less positive outcomes than autonomous motivation (Gagné & Deci, 2005). I therefore present a model that focuses instead on factors likely to increase autonomous motivation, and I combine these factors with those of the TPB—a theory that has already proven useful in predicting knowledge-sharing behavior.

The Theory of Planned Behavior

Because knowledge sharing is an intentional behavior, we can study it using the TPB in which intentions "are assumed to capture the motivational factors that influence a behavior" (Ajzen, 1991, p. 181). Three factors influence intentions: (1) attitude toward the behavior, (2) social norms regarding the behavior, and (3) beliefs about one's control over the behavior. Attitude is the degree to which one evaluates the behavior favorably or unfavorably. Subjective norm is the perceived social pressure to perform or not perform the behavior. Control beliefs are concerned with having the necessary skills, resources, and opportunities to engage in a behavior. They are similar to the concepts of perceived control, or self-efficacy (Bandura, 1982) and, as we will see, the need for

competence (Deci & Ryan, 2000). The three predictors of intention account on average for 50 percent of the variance in intention, and intention accounts for an average of 26 percent of the variance in behavior (Ajzen, 1991).

Researchers have used the Theory of Reasoned Action (Ajzen & Fishbein, 1980), from which the TPB was developed, to study knowledge-sharing behavior (e.g., Bock & Kim, 2002; Bock, Zmud, Kim, & Lee, 2005; Cabrera & Cabrera, 2005). Recent empirical findings also give credence to the usefulness of the TPB for studying knowledge-sharing behavior in organizations. I will present these findings along with the model. For example, Chiu, Hsu, and Wang (2006) found that reciprocity norms were positively related to knowledge-sharing behavior in a virtual community of practice.

Self-Determination Theory

Ajzen (1991) assumed that intentions are the motivational factors that influence behavior. He argued that the stronger a person's intention, the higher the likelihood that he or she will perform the behavior. However, research shows this is not always the case: The type of motivation to engage in a particular action, or people's reasons for engaging in it, also affect its performance (Sheldon & Elliot, 1998). Taking these reasons into account is likely to add to the prediction of knowledge-sharing behavior. For this reason, the model of knowledge-sharing motivation combines SDT (Deci & Ryan, 1985, 2000) with the TPB to predict knowledge sharing.

SDT (Deci & Ryan, 1985, 2000) provides a multidimensional framework with two second-order–level types of motivation. *Autonomous motivation* means engaging in an activity volitionally—for example, pursuing an activity out of interest and because it is enjoyable (intrinsic motivation), and pursuing it because it is personally meaningful and fits one's value system (identified regulation). *Controlled motivation* means engaging in an activity out of pressure that can come from outside sources, such as promised rewards and threats of punishment (external regulation), or inside sources, such as when one's self-esteem is contingent upon successfully completing a task (introjected regulation).

As mentioned, knowledge-sharing research thus far has mostly concentrated on controlled motivation (Cabrera & Cabrera, 2002)—namely, reciprocity, improving one's reputation, doing the right thing, and positive feelings. However, research shows autonomous motivation leads to more positive behavioral outcomes than controlled motivation (Gagné & Deci, 2005), such as better performance on complex and creative tasks (Amabile, 1982; Amabile, Goldfarb, & Brackfield, 1990; Grolnick & Ryan, 1987; McGraw & McCullers, 1979), active information seeking (Koestner & Losier, 2002), and goal attainment (Sheldon & Elliot, 1998). Because knowledge-sharing behavior is likely to be motivated in a way similar to helping and prosocial behavior, which are difficult to motivate through rewards and pressure (Frey, 1993), it may be particularly important to focus on increasing autonomous motivation. Indeed, research shows that attempting to motivate helping behavior with the use of tangible rewards decreases such behavior (Fabes, Fultz, Eisenberg, May-Plumlee, & Christopher, 1989; Kunda & Schwartz, 1983; Wright, George, Farnsworth, & McMahan, 1993). Similarly, research shows that incentives for goal attainment decrease engagement in organizational citizenship behavior (Wright et al., 1993). Moreover, autonomous motivation is superior to controlled motivation when it comes to motivating the performance and retention of volunteer workers (Gagné, 2003; Millette & Gagné, 2008) and recycling behavior (Green-Demers et al., 1997).

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Most telling is a recent study by Poortvliet, Janssen, Van Yperen, and Van de Vliert (2007)

that shows that people who hold performance goals (similar to extrinsic motivation) are less likely to exchange information with partners than people who hold mastery goals (similar to intrinsic motivation). They argue that mastery goals trigger a reciprocity orientation that facilitates sharing, which is similar to social exchange (Shore, Tetrick, Lynch, & Barksdale, 2006), while performance goals trigger an exploitation orientation that hinders sharing but facilitates efficient information use.

These results speak to the importance of considering *reasons* for sharing knowledge as an important predictor of sharing behavior. We could hypothesize that intrinsically motivated people will want to share knowledge simply out of their passion for their work and as an expression of themselves (similar to eagerness, as proposed by de Vries et al., 2006). Although this will likely lead to a high quantity of sharing, it may not necessarily lead to the most useful knowledge sharing and could even waste others' time. We could also hypothesize that people with identified motives will share knowledge to help others with their work or help their group achieve valued goals, which, in principle, would lead to more efficient sharing behavior. People with introjected motives may share to show off their knowledge and boost their self-esteem, in which case the information shared may not be useful to others. Finally, forcing people to share knowledge through the promise of a reward or a threat of punishment may result in the bare minimum of sharing required, which may be insufficient to the recipient. Therefore, the type of motivation for knowledge sharing may have deep consequences not only for the quantity of sharing, but also for the quality and usefulness of the shared information.

Sharing motivation is expected to moderate the intention-behavior link; thus, greater autonomous motivation (in relation to controlled motivation) should strengthen this link.

SDT also proposes that adopting either controlled or autonomous motivation depends on satisfying basic psychological needs for autonomy, competence, and relatedness. SDT defines needs as essential nutriments for optimal human development and integrity (Ryan, Sheldon, Kasser, & Deci, 1996). A need is basic when satisfying it promotes psychological health and when thwarting it undermines it. Because the three needs are basic to all individuals, SDT does not focus on individual differences in need strength but on satisfying them in a given context (Gagné & Deci, 2005). On the basis of SDT and the TPB, I present a model of knowledge-sharing motivation that incorporates quality of motivation, need satisfaction, and human resource management (HRM) practices that are likely to affect variables in the model.

The Model of Knowledge-Sharing Motivation

I propose a model that uses both the TPB and SDT constructs to predict intentions to share knowledge and actual sharing behavior in organizations. This model is compatible with previous models of knowledge sharing, such as Kelloway and Barling's (2000) model of knowledge use in organizations and Gottschalg and Zollo's (2007) interest alignment model. The major differences lie in conceptualizing motivation, which is now multidimensional, and in including psychological factors that influence the quality of motivation. The model I present explains in-depth how and why specific HRM practices will influence people's engagement in knowledge-sharing behavior and thus provides concrete advice to practitioners and organizations.

Consistently with SDT, the model in Figure 1 proposes that autonomous motivation predicts knowledge-sharing intention, which in turn predicts knowledge-sharing behavior. Consistently with the TPB, attitudes and norms toward knowledge sharing also predict intentions. Autonomous motivation predicts attitudes; the rationale is that people's attitudes toward sharing will become more positive when they internalize the value of sharing knowledge. Satisfying the need for competence replaces control beliefs, and the needs for autonomy and relatedness are added. Finally, norms moderate

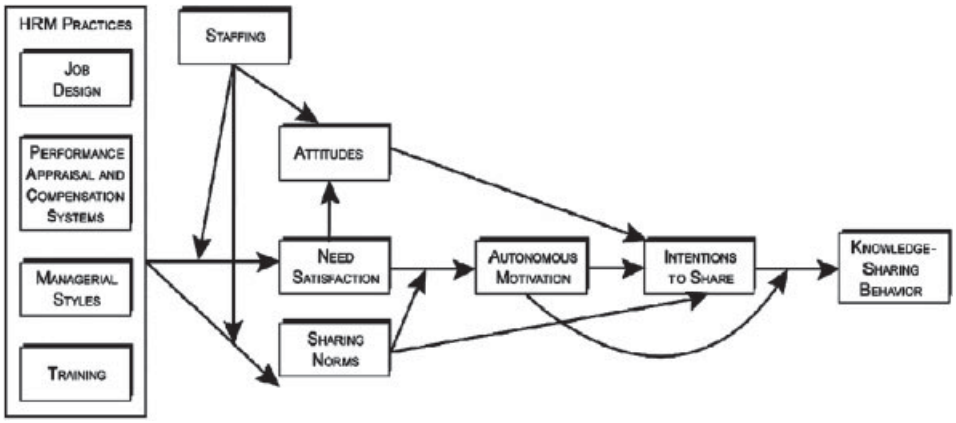

FIGURE 1. The Model of Knowledge-Sharing Motivation

the link between need satisfaction and autonomous motivation toward sharing knowledge; thus, positive sharing norms should strengthen this link. Moreover, sharing motivation is expected to moderate the intention-behavior link; thus, greater autonomous motivation (in relation to controlled motivation) should strengthen this link. The model also includes HRM practices likely to affect knowledge management. I evaluated these practices in terms of their potential to affect psychological variables in the model—that is, need satisfaction, attitudes, and norms. I chose these practices based on existing SDT research and from the practices Cabrera and Cabrera (2002, 2005) and Hislop (2002) suggest, including staffing, job design, performance appraisal and compensation systems, managerial styles, and training.

Hypothesis 1: Need satisfaction will be positively related to autonomous motivation to share knowledge.

When people feel competent, autonomous, and related to others with whom they have opportunities to share knowledge, I expect they will value and enjoy sharing their knowledge more (that is, they will adopt identified and/or intrinsic motivation toward sharing, or autonomous motivation). Research shows that work-related need satisfaction was related to greater psychological work engagement and well-being and to better performance evaluations (Baard, Deci, & Ryan, 2004; Deci et al., 2001). Breaugh (1985) found that feeling autonomous in one's job increased job involvement and quality of performance, which is consistent with Sheldon and Elliot's (1998) finding that autonomous motivation predicts greater effort and more goal attainment. Roca and Gagné (2008) found that need satisfaction was positively related to intention to use an e-learning system.

In the knowledge-sharing literature, many studies found results that are compatible with the notion that autonomy, competence, and relatedness are important. Bock and Kim (2002) found that expectations to improve work relationships (relatedness) and to make a significant contribution to organizational performance (competence) were positively related to sharing attitudes, intentions, and behavior. Park et al. (2004) found that a culture that encourages teamwork, employee support, and autonomy encourages knowledge sharing, while a culture that is demanding of employees and rule oriented discourages knowledge sharing. Lin (2007a) found that participative decision making (which influences autonomy) was positively related to knowledge sharing, while Quigley, Tesluk, Locke, and Bartol (2007) found that trust increased the effects of individual self-efficacy on knowledge transfer.

Social exchange theory has most often explained the effects found for trust and other relational variables, which I attribute to satisfying the relatedness need (Shore et al., 2006). Kuvaas (2008) recently showed

that a social exchange mindset was positively related to, while an economic exchange mindset was negatively related to, employees' intrinsic motivation. Moreover, intrinsic motivation completely mediated the positive relationship between social exchange and work effort and work quality, and partly mediated the relationship between social exchange and organizational citizenship behavior. Therefore, autonomous motivation is likely to explain why relatedness or a social exchange mindset is so important to behaviors like knowledge sharing.

Hypothesis 2: Autonomous motivation will be positively related to intention to share.

Based on SDT, I expect that autonomous motivation to share will increase intentions to share, and that autonomous motivation will mediate the link between need satisfaction and intention to share. Very few studies have examined this hypothesis. Mitchell et al. (2008) found that autonomous motivation toward using a new information technology was related to using more advanced system features. Consistently with this study, Osterloh and Frey (2000) suggested that intrinsic motivation is especially important when sharing tacit knowledge, which is more difficult to share than explicit knowledge. Lin (2007b) found a positive link between knowledge sharing and affective organizational commitment, which develops at least in part through autonomous work motivation (Gagné, Chemolli, Forest, & Koestner, 2009). Most recently, Malhotra, Galleta, and Kirsch (2008) found that autonomous motivation to use a Web-based educational platform was positively related to positive attitudes toward it and greater intentions to use it, whereas controlled motivation was negatively related to these variables.

Research on the motivation to engage in prosocial and helping behavior also offers some initial evidence for this hypothesis. For example, Cabrera and Cabrera (2002) compared the knowledge-sharing situation to a public goods dilemma in which individuals must decide whether to contribute to a pool of resources (e.g., an agricultural field or a fishery) that is freely available to them, taking into consideration both personal gains and costs. Their framework does not consider the quality of people's motives to share or not share their resources, as they use an expectancy-value framework to explain motivational considerations in predicting people's knowledge-sharing behavior. These considerations include efficacy beliefs and instrumentality considerations (What do I gain and lose from doing it?), which can be calculative or exchange based (Shore et al., 2006) and thus closer to the concept of controlled motivation. Sheldon and McGregor (2000) found that people who held extrinsic motives harvested more in a commons dilemma game than people who held intrinsic motives. Moreover, groups with a greater proportion of people who held extrinsic motives did not harvest as much because the commons was depleted more quickly. If we can compare a knowledge-sharing situation to a public goods dilemma, we can then assume that quality of motivation will affect willingness to share knowledge. Frey (1993) provides further evidence to support this argument; he reviewed research on the effectiveness of incentive and sanction systems on behaviors like environmental conservation and giving blood and concluded that the use of rewards (an extrinsic motivator) can have negative effects on ethical and prosocial behavior. Moreover, Wang (2004) found when people were asked to share information with a colleague with whom they were competing for a promotion, they were less likely to share information with this person than if they were not competing with him or her.

Hypothesis 3: Autonomous motivation will be positively related to having positive attitudes toward knowledge sharing.

I expect that being motivated to share out of interest or personal meaning will lead to having more positive attitudes toward sharing knowledge. Internalization

would play an important role in creating these positive attitudes. If people's psychological needs are satisfied at work, they are more likely to internalize activities the organization values; this leads to more autonomous motivation for these activities. In the case of sharing, this autonomous motivation (i.e., considering sharing to be important in reaching organizational goals or finding an interest in sharing one's knowledge) will lead to developing positive attitudes toward sharing. As mentioned, Malhotra et al. (2008) found that autonomous motivation was related to positive attitudes toward a Web-based educational platform. Bock and Kim (2002) found that expecting to increase relatedness and competence (through sharing one's knowledge) led to more positive attitudes toward sharing. We can easily argue that autonomous motivation could mediate this link.

Hypothesis 4: Autonomous motivation will moderate the relationship between intention and behavior.

A spin-off of SDT, self-concordance theory (Sheldon & Elliot, 1998), proposes that goals pursued for autonomous reasons are more likely to be reached and offer personal satisfaction than goals pursued for controlled reasons. I therefore expect that when a person is autonomously motivated to share knowledge, not only will the intention increase, but it will lead to better goal regulation (e.g., Muraven, Rosman, & Gagné, 2007), which will increase the link between intention and behavior. As argued, the type of motivation to share knowledge can lead to qualitatively different sharing behavior. Thus, an intrinsically motivated person may passionately and spontaneously share his or her knowledge with others, whether or not it is requested, whereas a person high on identified regulation may willingly share when he or she deems it necessary and useful. This may lead to differentially useful knowledge sharing but overall quantitatively higher sharing. In contrast, a person high on introjected regulation may share when it gives him or her an opportunity to boost his or her image (similar to impression management; Rioux & Penner, 2001), and a person high on external regulation may only engage in minimally sanctioned sharing, which may lead to less useful and to quantitatively less sharing. This is consistent with Bolino's (1999) argument that organizational citizenship behavior motivated by impression management will be less useful to the organization than behavior motivated by altruism. Indeed, Rioux and Penner (2001) subsequently showed that impression management motives were less related to supervisor and peer reports of organizational citizenship behaviors than prosocial motives.

Providing preliminary support for this proposition, Chatzisarantis, Frederick, Biddle, Hagger, and Smith (2007) found that although the TPB variables predicted intentions to engage and actual engagement in a physical activity, the degree of autonomous versus controlled motivation behind these intentions added to the prediction of actual engagement in physical activity beyond the TPB variables. Chatzisarantis and Hagger (2007) also found that degree of mindfulness augmented the relation between intention and behavior toward physical activity. Mindfulness is defined as enhanced awareness of one's own emotions, behavior, and environment; it has been positively related to autonomous motivation (Brown & Ryan, 2003).

I expect that being motivated to share out of interest or personal meaning will lead to having more positive attitudes toward sharing knowledge.

Hypothesis 5: Attitudes toward knowledge sharing will be positively related to intention to share.

Based on the TPB, I expect that having positive attitudes about sharing knowledge will be related to greater intention to share. Chiu et al. (2006) found positive relationships between outcome expectations and knowledge-sharing behavior. Bock and Kim (2002) and Bock et al. (2005) found positive relationships between positive attitudes and sharing intentions and behavior.

Hypothesis 6: Sharing norms will be positively related to intention to share.

Based on the TPB, I expect that positive sharing norms will be related to greater intention to share. Brown and Duguid (1991) and Chiu et al. (2006) found that sharing norms were positively related to knowledge-sharing behavior in communities of practice. Kelloway and Barling (2000) made a similar prediction by arguing a positive link between opportunities to share (which include a culture that encourages knowledge use) and knowledge use.

Hypothesis 7: Sharing norms will moderate the relationship of need satisfaction and autonomous motivation.

Having psychological needs satisfied at work does not guarantee that employees will internalize values conducive to knowledge sharing. They are only more likely to internalize whatever norm the organization promotes. Therefore, the combination of norms conducive to knowledge sharing with high need satisfaction will lead to greater autonomous motivation to share knowledge. In other words, sharing norms will qualify or moderate the effect of need satisfaction on autonomous motivation to share knowledge. This is where HRM practices come into play; they will influence either or both need satisfaction and the development of sharing norms. I say *either or both* because one practice may provide need satisfaction, and another practice may encourage the development of sharing norms. If they are combined, they can together lead to developing autonomous motivation to share knowledge. At the same time, other practices may provide need satisfaction and encourage developing sharing norms.

HRM Practices that Affect the Knowledge-Sharing Motivation Model

Riege (2005) argued there are organizational barriers to knowledge sharing, such as the lack of leadership, lack of appropriate reward system, and lack of sharing opportunities. Based on Cabrera and Cabrera (2005) and on Kelloway and Barling (2000), I propose five important predictors of attitudes, need satisfaction, and sharing norms: staffing, job design, performance appraisal and compensation systems, managerial styles, and training. These can be developed and managed in ways that will influence knowledge-sharing behavior in organizations.

Hypothesis 8a: Staffing decisions that take into account the fit of the incumbents' values to the organizational values will be positively related to selecting incumbents who have positive sharing attitudes.

Hypothesis 8b: Staffing decisions that take into account the fit of the incumbents' values to the organizational values will moderate the effect of the HRM practices on need satisfaction, so that the better the fit, the greater the relationship between HRM practices and need satisfaction.

Hypothesis 8c: Staffing decisions that take into account the fit of the incumbents' values to the organizational values will moderate the effect of HRM practices on developing sharing norms, so that the greater the fit, the greater the relationship between HRM practices and sharing norms.

Cabrera and Cabrera (2005) proposed that staffing procedures that consider person-environment fit to ensure congruence of individual and organizational values and goals will facilitate sharing among employees. When an organization that values knowledge sharing selects employees who share this value, it will end up with employees who have a positive attitude about sharing to start with. In addition, if we assume that organizational values will drive the development of HRM practices, and we hire people who share these values, the likelihood that HRM practices will fulfill employees' needs will be higher. They are more likely to use competencies they may have developed out of their own personal values; they are more likely to find similarities between the self and the organization, which enhance

feelings of relatedness; and they are more likely to internalize the values HRM practices promote, which enhance feelings of autonomy. Therefore, I can expect that staffing decisions based on value fit will enhance the relationship between HRM practices and need satisfaction. Finally, if the organization values knowledge sharing and promotes it through HRM practices, and the organization bases hiring on value fit, it is more likely that employees will develop sharing norms through these HRM practices. In other words, staffing based on value fit will enhance the relation between HRM practices and sharing norms.

Hypothesis 9a: Motivating job design will be positively related to need satisfaction.

Hypothesis 9b: Motivating job design will be positively related to developing sharing behavior.

Although I assume that adequate job design, just like adequate technologies, may have a direct impact on facilitating knowledge sharing, job design is also likely to affect knowledge-sharing behavior through its effect on work motivation. In other words, job designs that positively influence the three psychological needs of autonomy, competence, and relatedness are likely to have an indirect positive influence on knowledge-sharing motivation (without forgetting the moderating influence of sharing norms on the relationship between need satisfaction and motivation). I conceptualize a motivating job design along the lines of Job Characteristics Theory (Hackman & Oldham, 1980), which recommends that workers use a variety of tasks and skills, do an entire piece of work from beginning to end, have direct contact with those their work affects, have some decision-making power, and receive performance feedback. Researchers have related these characteristics to feelings of empowerment (Gagné, Senécal, & Koestner, 1997; Thomas & Velthouse, 1990), which is similar to need satisfaction. Thus, structuring work to promote employee autonomy, relationships, and the use of one's full competencies will likely have positive effects on autonomous motivation and work outcomes (Cabrera & Cabrera, 2005; van Knippenberg & van Schie, 2000; Wall, Kemp, Jackson, & Clegg, 1986).

Moreover, a motivating job design or the use of autonomous work groups could influence the development of norms about sharing knowledge. Because such design usually enhances interdependence and often uses teamwork, it implies greater communication between coworkers and greater opportunities and need to share knowledge in order to accomplish organizational goals. Kelloway and Barling (2000) indeed argued that job design can influence workers' ability, motivation, and opportunities to use knowledge. They also proposed that opportunities for social interactions, such as communities of practice, can facilitate sharing behavior. Rosen, Furst, and Blackburn (2007) also identified several barriers to knowledge sharing in virtual teams that could be resolved by better team-based work design that increases social interactions among team members. (Arranging these interactions virtually would require some thought and appropriate technologies.)

Hypothesis 10a: Performance appraisal systems that focus on employee development as opposed to employee evaluation will be positively related to need satisfaction.

Hypothesis 10b: Performance appraisal systems that include knowledge sharing as one performance criterion will be positively related to sharing norms.

Hypothesis 10c: Certain characteristics of compensation systems will be positively related to need satisfaction.

Hypothesis 10d: Certain characteristics of compensation systems will be positively related to sharing norms.

Performance appraisal systems that include an assessment of knowledge-sharing behaviors, feedback on performing such behavior, and appropriate reward for the behavior (Cabrera & Cabrera, 2005) should enhance

knowledge-sharing behavior by satisfying the three needs and promoting sharing norms. Positive feedback will enhance feelings of competence; communicating such feedback will improve relationship quality with the manager, thus satisfying relatedness. Open discussions of the performance assessment and a participative method for setting improvement goals will also improve feelings of autonomy. Finally, performance appraisal interviews offer a great opportunity for a manager to communicate that the organization values knowledge sharing, thus enhancing the development of sharing norms.

Performance appraisal systems that include an assessment of knowledge-sharing behaviors, feedback on performing such behavior, and appropriate reward for the behavior (Cabrera & Cabrera, 2005) should enhance knowledge-sharing behavior.

Although Cabrera and Cabrera (2005) stress the importance of developmental rather than evaluative performance appraisals and the use of noncontrolling rewards, this is not formally embedded in their model. In contrast, my proposed model considers that the form of the performance appraisal and the type of reward system may influence need satisfaction and autonomous motivation. SDT offers specific advice about how to appraise and reward behavior. Deci, Koestner, and Ryan (1999) conducted a meta-analysis of 128 laboratory studies on the effects of rewards on intrinsic motivation. They found that verbal rewards (i.e., positive feedback) have a positive influence on intrinsic motivation. However, they found that tangible rewards (e.g., money) that people perceive as controlling (i.e., they decrease feelings of autonomy) and that do not provide much information about one's competence are detrimental to intrinsic motivation. Indeed, a laboratory study by Ryan, Mims, and Koestner (1983) found that positive feedback was superior to tangible rewards that conveyed competence for enhancing intrinsic motivation. Therefore, recognition is more likely to encourage knowledge sharing than monetary or other tangible rewards. The knowledge-sharing literature offers similar arguments that tangible rewards have often been deemed insufficient and possibly detrimental to the motivation to share (McDermott & O'Dell, 2001; O'Dell & Grayson, 1998; Tissen et al., 1998). Kelloway and Barling (2000) argued that rewards can either enhance or detract from knowledge use in organizations; Bock and Kim (2002) and Bock et al. (2005) found that rewards expected for sharing one's knowledge were negatively related to attitudes toward knowledge sharing. Kelloway and Barling (2000) instead favor skill-based pay structures that are competitive enough to attract and retain knowledgeable workers and equitable. Moreover, they advocate pay structures that are not too salient so that they do not detract from promoting the internalization of sharing norms. This is also consistent with exchange theory (Shore et al., 2006), which argues that a social exchange mindset is more conducive to knowledge sharing than an economic exchange mindset (Lucas & Ogilvie, 2006).

To better apply SDT-based findings to compensation systems, which are more complex than simple rewards given in a laboratory study, Gagné and Forest (2008) have proposed that the monetary value of the reward, its perceived equity, the ratio of variable versus fixed portions of the reward, what the variable part is contingent on, and the number of people whose performance determines the size of the reward will affect work motivation through their effect on satisfying need. Therefore, compensation systems that promote feelings of competence, autonomy, and relatedness will likely lead to greater autonomous motivation, while systems that thwart these needs will likely promote controlled motivation. Gagné and Forest's (2008) advice is compatible with Bartol and Srivastava's (2002) recommendations, including the use of group-based rewards to foster cooperation and the use of intrinsic rewards and recognition to foster feelings of competence. Cabrera and Cabrera (2002) also favor the use of group-based rewards, such as gain sharing or profit sharing to increase the cooperation necessary for knowledge sharing.

Knowledge-sharing research that has examined the effects of rewards focused mostly

on group rewards and fairness issues. Research on the effects of individual and group rewards on knowledge-sharing behavior has not yielded clear conclusions. For example, Hsu, Ju, Yen, and Chang (2007) found that personal outcomes (such as recognition, making friends, and reciprocated sharing) were more highly related to knowledge-sharing behavior than to community outcomes (achieving the virtual community's goals, enriching the knowledge base). On the other hand, research shows that group incentives have a greater positive impact on knowledge sharing than individual incentives do, and this effect is stronger when sharing norms are strong (Gupta & Govindajaran, 2000; Quigley et al., 2007). Chiu et al. (2006) found that only group outcome expectations had a positive effect on sharing. By taking into account the other factors Gagné and Forest (2008) proposed, we may be able to discover better ways to reward knowledge-sharing behavior.

Fairness is another important factor affecting knowledge sharing (Cabrera & Cabrera, 2005). Lin (2007b) found that procedural and distributive justice perceptions were positively related to tacit knowledge-sharing behavior. Bock et al. (2005) also found that fairness contributes to a positive organizational climate, which has a positive effect on intentions to share knowledge. Fairness also affects autonomous work motivation. Gagné, Bérubé, and Donia (2007) found both procedural and distributive justice were positively related to autonomous work motivation, and need satisfaction mediated these effects. Because the Gagné and Forest (2008) model of compensation also takes fairness issues into account, it may be a useful guide in studying the effects of compensation systems on knowledge-sharing behavior.

Hypothesis 11a: Motivating managerial styles will be positively related to need satisfaction.

Hypothesis 11b: Managers who promote knowledge sharing among their subordinates will enhance organizational norms about sharing.

Managerial style is the interactional styles managers use with their subordinates. In SDT, managerial style is defined as the psychological need support—labeled autonomy support—managers give employees. In management research, managerial style has been studied mostly under the rubric of leadership. Both the SDT literature on autonomy support and the leadership literature argue that interaction styles are an important lever of motivation. Managerial autonomy support is a collection of managerial behaviors proven to influence need satisfaction at work (Deci, Connell, & Ryan, 1989; Deci et al., 2001). These behaviors include understanding and acknowledging subordinates' perspectives, encouraging self-initiation, minimizing pressures and controls, and providing relevant information. Autonomy support satisfies the three psychological needs by using minimal pressure (avoiding the use of evaluation, deadlines, surveillance, and tangible rewards) and providing a rationale for requests, choice, decision-making power, and opportunities for initiative. Providing information and resources, training, optimal challenges and goals, and constructive feedback support competence. Increased interactions, supporting cooperation, sharing information and experiences, and acknowledging feelings support relatedness.

Recognition is more likely to encourage knowledge sharing than monetary or other tangible rewards.

Gagné and Deci (2005) proposed that people tend to internalize and integrate the regulation of a socially valued activity when it is encouraged through an autonomy-supportive social context. In other words, autonomous motivation for the target activity or domain will increase. A laboratory study by Deci, Eghrari, Patrick, and Leone (1994) found that acknowledging others' perspectives, providing meaningful rationales, and minimizing controls influenced internalizing the value for a boring target-detection task. Moreover, supported participants reported greater enjoyment of the boring activity and spent more time engaging in the activity than nonsupported participants. Deci et al. (1989) showed that training managers who maximized subordinates' opportunities for initiative, provided

informational feedback, and acknowledged subordinates' perspectives improved subordinates' attitudes and trust in the corporation. Since trust is an important lever of knowledge sharing (Hsu et al., 2007), we can expect that such managerial behavior fosters knowledge sharing. Blais and Brière (1992) found that managerial support enhanced subordinates' autonomous motivation and, in turn, the quality of the subordinates' performance. Lynch, Plant, and Ryan (2005) found that when a state-run psychiatric hospital introduced a new program for handling patients, staff members who perceived greater support from their supervisors showed greater autonomous motivation for implementing the program than those who experienced their supervisors as more controlling.

Researchers have found that transformational leadership, defined as influencing others through inspiration and vision (Bass & Riggio, 2006), engenders trust in the leader and between followers (Deluga, 1995; Hoyt & Blascovitch, 2003; Pillai, Schriesheim, & Williams, 1999; Podsakoff, MacKenzie, Moorman, & Fetter, 1990). Numerous writings have argued that trust is an essential ingredient for knowledge sharing (Cabrera & Cabrera, 2005; Kelloway & Barling, 2000; Riege, 2005). Transformational leadership also enhances team cohesion and feeling related to others, which leads followers to commit to a common cause (Bass & Riggio, 2006) and, I argue, raises motivation to share knowledge in order to reach this common goal (Ryan & Deci, 2000). Transformational leadership consists of four clusters of behavior: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. These behaviors are not only likely to satisfy followers' needs for autonomy, competence, and relatedness (Shamir, House, & Arthur, 1993), but may foster value internalization, or the adoption of sharing norms, which is essential to knowledge-sharing behavior (Despres & Hiltrop, 1995). Bono and Judge (2003) indeed found that transformational leadership influences autonomous work motivation. Leaders have a unique opportunity to encourage the development of sharing norms by articulating them, acting as a role model by sharing their own knowledge, and helping subordinates synthesize incoming information and articulate a common goal that will facilitate knowledge creation (Nonaka, von Krogh, & Voelpel, 2006; O'Neill & Adya, 2007; Rosen et al., 2007). Indeed, Connelly and Kelloway (2003) found positive relations between management support and what they call a knowledge-sharing culture (i.e., norms). Leadership and having a shared vision have both been found to be positively related to knowledge sharing in work teams (Chiu et al., 2006; Srivastava, Bartol, & Locke, 2006).

Hypothesis 12: Training will positively affect sharing norms and enhance need satisfaction.

Training offers a great opportunity for an organization to communicate and create norms about sharing behavior. The simple fact of having training opportunities influences task performance, organizational citizenship behavior, and turnover intentions, which can be explained through increased intrinsic motivation (Dysvik & Kuvaas, 2008). With regard to knowledge sharing, training content can include teaching communication skills, and teaching what knowledge to share and how to share it. How the organization conducts training also matters a great deal. Like managers, trainers need to support employees' psychological needs if internalization is to take place. This is a well-known fact in sport psychology in which many studies have shown that supportive coaching styles influence athletes' motivation (Hollembeak & Amorose, 2005; Mageau & Vallerand, 2003). Black and Deci (2000) demonstrated that organic chemistry instructors who were autonomy supportive to college students saw an increase in their autonomous motivation toward chemistry and an increase in grades. Trainers, like leaders, are in a unique position to promote sharing norms. Therefore, the recommendations for managerial styles hold for trainers as well.

Discussion

I proposed a model of knowledge-sharing motivation based on the TPB and SDT. Adding SDT allows us to account for motivation quality, which is likely to enhance the prediction of knowledge-sharing behavior. Moreover, the different types of motivation in SDT can help predict the quantity and the usefulness of the shared knowledge. Finally, SDT can offer practical advice about how to develop and design HRM practices that will promote autonomous motivation to share knowledge. By proposing that satisfying three psychological needs is the key to promoting autonomous motivation, one can design or redesign HRM practices to fulfill those needs. This model predicts that five HRM practices—staffing, job design, performance appraisal and compensation systems, managerial styles, and training—will influence attitudes, need satisfaction, and sharing norms.

This model has practical implications for designing these five practices. If staffing procedures focus on selecting people whose values are congruent with the organization's values, and if the organization values knowledge sharing, the organization is more likely to select people with a positive attitude about sharing their knowledge. The other major impact of staffing based on value fit is to enhance the impact of other HRM practices on knowledge-sharing behavior. Job design can not only create opportunities to exchange knowledge, but also motivate it. Following Hackman and Oldham's (1980) recommendations and the more recent version by Morgeson and Humphrey (2006), which takes into consideration the knowledge characteristics of work, which include job complexity, information processing, problem solving, and specialization, can help organizations foster knowledge exchange. Incorporating the measurement of knowledge-sharing behavior or indicators of successful knowledge transfer into performance appraisals can enhance sharing norms. But such performance appraisals must also have a developmental rather than an evaluative focus, because developmental appraisals have been shown to enhance intrinsic motivation and performance (Kuvaas, 2007), while evaluative appraisals have been shown to decrease motivation and creativity (Amabile, 1979). Designing effective compensation systems to encourage knowledge sharing will require more research, but models such as the Gagné and Forest (2008) model may help test different options with a deeper understanding of their effects on employee motivation and behavior. It is possible to train managers to be more transformational in order to foster sharing norms and fulfill employees' basic psychological needs, as leadership training has proven successful in affecting employee attitudes and performance (Barling, Weber, & Kelloway, 1996; Deci et al., 1989; Dvir, Eden, Avolio, & Shamir, 2002). Finally, employee training that promotes sharing norms and shows how to do it well will likely have a positive impact on knowledge-sharing behavior.

By proposing that satisfying three psychological needs is the key to promoting autonomous motivation, one can design or redesign HRM practices to fulfill those needs.

Although this model only focuses on motivational processes affecting knowledge-sharing behavior, other variables can also influence knowledge sharing, such as the larger organizational culture or the creation of shared mental models (Cabrera & Cabrera, 2005). It is also possible for HRM practices to interact with one another in affecting knowledge-sharing behavior. For example, Gagné and Forest (2008) predicted that leadership styles and the way leaders communicate information about compensation systems will influence the compensation system's impact on employee motivation. Leadership has been shown in other research to influence the way people perceive the design of their job, which in turn influences employees' intrinsic motivation (Piccolo & Colquitt, 2006). Other research has also shown that job design can buffer against abusive leadership and protect employees against emotional exhaustion (Wu, Hu, Lin, & Hsu, 2008). One could therefore add moderating effects between HRM practices in the model.

One could also add more variables to this motivational model. For example, the relationship between HRM practices and knowledge sharing could be moderated by the stages of knowledge creation that Nonaka et al. (2006) propose, including socialization, externalization, combination, and internalization. Individual difference variables may also influence some factors in this model, such as tolerance for ambiguity, openness to experience, or extroversion (Costa & McCrae, 1985; Norton, 1975).

It is surprising that most of the empirical research on knowledge sharing has used case study or qualitative methodologies, and many only use anecdotal evidence (Hislop, 2002). Future research should develop quantitative methods to test existing models of knowledge-sharing behavior, including the present one. There are several ways to test the model of knowledge-sharing motivation. Organizational surveys are convenient but not very powerful ways to test hypotheses. Nonetheless, scales can be developed to assess subjective norms, attitudes, and control beliefs, as well as behavioral intentions to share knowledge, following the guidelines of the TPB (Ajzen, 1991). A continuum measure of motivation to share knowledge based on SDT could also be developed (Deci & Ryan, 2000). One can measure actual knowledge-sharing behavior using self-reports of sharing frequency (e.g., How many times did you share your knowledge in the past six months?), as well as reports from other people (e.g., managers and peers). One can also use diary studies or a daily reconstruction method (Kahneman, Krueger, Schkade, Schwartz, & Stone, 2004) to ask employees to rate the frequency of sharing behavior every working day for a specific period of time (e.g., four weeks). This technique would allow examining the effects of daily work events and daily need satisfaction on discrete acts of sharing, similar to what Gagné, Ryan, and Bargmann (2003) did with gymnasts. One could also use network analysis and knowledge mapping techniques to examine who shares with whom, and whether the shared knowledge is useful—which would allow for examining factors like trust or quality of relationships on willingness to share. Finally, one could take advantage of the increasingly popular wikis, open-source communities, and communities of practice that facilitate sharing in order to study factors that motivate people to share their knowledge on such platforms. For example, Patterson, Gellatly, Arazy, and Jang (2007) found that wikis that were evaluated as high on the five core job characteristics (Hackman & Oldham, 1980) had participants with higher autonomous motivation to use the wiki and produced higher-quality contributions. Chiu et al. (2006) similarly found that among many factors, network ties were positively related to quantity and quality of knowledge sharing in a virtual community of practice.

It is my hope that this new model of knowledge-sharing motivation, the suggested HRM practices, and the suggested research methods will inspire scholars and practitioners alike to dig deeper into this very important area of inquiry.

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References

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall.

Amabile, T. M. (1979). Effects of external evaluations on artistic creativity. Journal of Personality and Social Psychology, 37(2), 221–233.

Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. Journal of Personality and Social Psychology, 43(5), 997–1013.

Amabile, T. M., Goldfarb, P., & Brackfield, S. C. (1990). Social influences on creativity: Evaluation, coaction, and surveillance. Creativity Research Journal, 3(1), 6–21.

Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. Journal of Applied Social Psychology, 34(10), 2045–2068.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37(2), 122–147.

Barling, J., Weber, T., & Kelloway, E. K. (1996). Effects of transformational leadership training on attitudinal and financial outcomes: A field experiment. Journal of Applied Psychology, 81(6), 827–832.

Bartol, K. M., & Srivastava, A. (2002). Encouraging knowledge sharing: The role of organizational reward systems. Journal of Leadership and Organizational Studies, 9(1), 64–76.

Bass, B. M., & Riggio, R. E. (2006). Transformational leadership (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. Science Education, 84(6), 740–756.

Blais, M. R., & Brière, N. M. (1992). On the mediational role of feelings of self-determination in the workplace: Further evidence and generalization. Unpublished manuscript, University of Quebec at Montreal.

Bock, G.-W., & Kim, Y.-G. (2002). Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing. Information Resources Management Journal, 15(2), 14–21.

Bock, G.-W., Zmud, R. W., Kim, Y.-G., & Lee, J.-N. (2005). Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. MIS Quartely, 29(1), 87–111.

Boland, R. J., & Tenkasi, R. V. (1995). Perspective making and perspective taking in communities of knowing. Organization Science, 6(4), 350–383.

Bolino, M. C. (1999). Citizenship and impression management: Good soldiers or good actors? Academy of Management Review, 24(1), 82–98.

Bono, J. E., & Judge, T. A. (2003). Self-concordance at work: Understanding the motivational effects of transformational leaders. Academy of Management Journal, 46(5), 554–571.

Breaugh, J. A. (1985). The measurement of work autonomy. Human Relations, 38(6), 551–570.

Brown, J. S., & Duguid, P. (2000). The social life of information. Boston: Harvard Business School Press.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. Journal of Personality and Social Psychology, 84(4), 822–848.

Cabrera, A., & Cabrera, E. F. (2002). Knowledge-sharing dilemmas. Organization Studies, 23(5), 687–710.

Cabrera, E. F., & Cabrera, A. (2005). Fostering knowledge sharing through people management practices. International Journal of Human Resource Management, 16(5), 720–735.

Chatzisarantis, N. L. D., Frederick, C., Biddle, S. J. H., Hagger, M. S., & Smith, B. (2007). Influences of volitional and forced intentions on physical activity and effort within the theory of planned behavior. Journal of Sports Sciences, 25(6), 699–709.

Chatzisarantis, N. L. D., & Hagger, M. S. (2007). Mindfulness and the intention-behavior relationship within the theory of planned behavior. Personality and Social Psychology Bulletin, 33(5), 663–676.

Chiu, C.-M., Hsu, M.-H., & Wang, E. T. G. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. Decision Support Systems, 42(3), 1872–1888.

Connelly, C. E., & Kelloway, E. K. (2003). Predictors of employees' perceptions of knowledge sharing culture. Leadership and Organization Development Journal, 24(5/6), 294–301.

Costa, P. T., Jr., & McCrae, R. R. (1985). Manual for the NEO personality inventory. Odessa, FL: Psychological Assessment Resources.

Davenport, T., & Prusak, L. (1998). Working knowledge: How organizations manage what they know. Boston: Harvard Business School Press.

Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in a work organization. Journal of Applied Psychology, 74(4), 580–590.

Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. Journal of Personality, 62(1), 119–142.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. Psychological Bulletin, 125(6), 627–668.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11(4), 227–268.

Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former Eastern Bloc country. Personality and Social Psychology Bulletin, 27(8), 930–942.

Deluga, R. J. (1995). The relation between trust in the supervisor and subordinate organizational citizenship behavior. Military Psychology, 7(1), 1–16.

Despres, C., & Hiltrop, J. M. (1995). Human resource management in the knowledge age: Current practice and perspectives on the future. Employee Relations, 17(1), 9–23.

de Vries, R. E., van den Hooff, B., & de Ridder, J. A. (2006). Explaining knowledge sharing: The role of team communication styles, job satisfaction, and performance beliefs. Communication Research, 33(2), 115–135.

Dvir, T., Eden, D., Avolio, B. J., & Shamir, B. (2002). Impact of transformational leadership on follower development and performance: A field experiment. Academy of Management Journal, 45(4), 735–744.

Dysvik, A., & Kuvaas, B. (2008). The relationship between perceived training opportunities, work motivation and employee outcomes. International Journal of Training and Development, 12(3), 138–157.

Fabes, R. A., Fultz, J., Eisenberg, N., May-Plumlee, T., & Christopher, F. S. (1989). Effects of rewards on children's prosocial motivation: A socialization study. Developmental Psychology, 25(4), 509–515.

Frey, B. S. (1993). Motivation as a limit to pricing. Journal of Economic Psychology, 14(4), 635–664.

Gagné, M. (2003). The role of autonomy support and autonomy orientation in the engagement of prosocial behavior. Motivation and Emotion, 27(3), 199–223.

Gagné, M., Bérubé, N. & Donia, M. (2007, April). Relationships between different forms of organizational justice and different motivational orientations. Poster presented at the annual meeting of the Society for Industrial and Organizational Psychology, New York.

Gagné, M., Chemolli, E., Forest, J., & Koestner, R. (2009). The temporal relations between work motivation and organizational commitment. Psychologica Belgica, 48(2/3), 219–241.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. Journal of Organizational Behavior, 26(4), 331–363.

Gagné, M., & Forest, J. (2008). The study of compensation systems through the lens of self-determination theory: Reconciling 35 years of debate. Canadian Psychology, 49(3), 225–232.

Gagné, M., Ryan, R. M., & Bargmann, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. Journal of Applied Sport Psychology, 15(4), 372–390.

Gagné, M., Senécal, C., & Koestner, R. (1997). Proximal job characteristics, feelings of empowerment, and intrinsic motivation: A multidimensional model. Journal of Applied Social Psychology, 27(14), 1222–1240.

Gottschalg, O., & Zollo, M. (2007). Interest alignment and competitive advantage. Academy of Management Review, 32(2), 418–437.

Green-Demers, I., Pelletier, L. G., & Ménard, S. (1997). The impact of behavioural difficulty on the saliency of the association between self-determined motivation and environmental behaviours. Canadian Journal of Behavioural Science, 29(3), 157–166.

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. Journal of Personality and Social Psychology, 52(5), 890–898.

Gupta, A. K., & Govindajaran, V. (2000). Knowledge management's social dimension: Lessons from Nucor Steel. MIT Sloan Management Review, 42(1), 71–81.

Hackman, J. R., & Oldham, G. R. (1980). Work redesign. Reading, MA: Addison-Wesley.

Hislop, D. (2003). Linking human resource management and knowledge management via commitment. Employee Relations, 25(2), 182–202.

Hollembeak, J., & Amorose, A. J. (2005). Perceived coaching behaviors and college athletes' intrinsic motivation: A test of self-determination theory. Journal of Applied Sport Psychology, 17(1), 20–36.

Hoyt, C. L., & Blascovich, J. (2003). Transformational and transactional leadership in virtual and physical environments. Small Group Research, 34(6), 678–715.

Hsu, M.-H., Ju, T. L., Yen, C.-H., & Chang, C.-M. (2007). Knowledge sharing behavior in virtual communities: The relationship between trust, self-efficacy, and outcome expectations. International Journal of Human-Computer Studies, 65(2), 153–169.

Ipe, M. (2003). Knowledge sharing in organizations: A conceptual framework. HRM Development Review, 2(4), 337–359.

Kahneman, D., Krueger, A. B., Schkade, D., Schwartz, N., & Stone, A. (2004). A survey method for characterizing daily life experience: The day reconstruction method. Science, 306(5702), 1776–1780.

Kelloway, E. K., & Barling, J. (2000). Knowledge work as organizational behavior. International Journal of Management Reviews, 2(3), 287–304.

Koestner, R., & Losier, G. F. (2002). Distinguishing three ways of being internally motivated: A closer look at introjection, identification, and intrinsic motivation. In E. L. Deci & R. M. Ryan (Eds.), Handbook of self-determination research (pp. 101–121). Rochester, NY: University of Rochester Press.

Kunda, Z., & Schwartz, S. H. (1983). Undermining intrinsic moral motivation: External reward and self-presentation. Journal of Personality and Social Psychology, 45(4), 763–771.

Kuvaas, B. (2007). Different relationships between perceptions of developmental performance appraisal and work performance. Personnel Review, 36(3), 378–397.

Kuvaas, B. (2008). Social and economic exchange perceptions and intrinsic motivation among knowledge workers. Unpublished manuscript, Norwegian School of Management, Oslo.

Lin, C.-P. (2007a). To share or not to share: Modeling knowledge sharing using exchange ideology as a moderator. Personnel Review, 36(3), 457–475.

Lin, C.-P. (2007b). To share or not to share: Modeling tacit knowledge sharing, its mediators, and antecedents. Journal of Business Ethics, 70(4), 411–428.

Lucas, L. M., & Ogilvie, D. T. (2006). Things are not always what they seem: How reputations, culture, and incentives influence knowledge transfer. Learning Organization, 13(1), 7–21.

Lynch, M. F., Jr., Plant, R., & Ryan, R. M. (2005). Psychological needs and threat to safety: Implications for staff and patients in a psychiatric hospital for youth. Professional Psychology: Research and Practice, 36(4), 415–425.

Mageau, G. A., & Vallerand, R. J. (2003). The coach-athlete relationship: A motivational model. Journal of Sports Sciences, 21(11), 883–904.

Malhotra, Y., Galleta, D. F., & Kirsch, L. J. (2008). How endogenous motivation influences user intentions: Beyond the dichotomy of extrinsic and intrinsic user motivations. Journal of Management Information Systems, 25(1), 267–299.

McDermott, R., & O'Dell, C. (2001). Overcoming culture barriers to sharing knowledge. Journal of Knowledge Management, 5(1), 76–85.

McGraw, K. O., & McCullers, J. C. (1979). Evidence of a detrimental effect of extrinsic incentives on breaking a mental set. Journal of Experimental Social Psychology, 15(3), 285–294.

Millette, V., & Gagné, M. (2008). Designing volunteers' tasks to maximize motivation, satisfaction and performance: The impact of job characteristics on the outcomes of volunteer involvement. Motivation and Emotion, 32(1), 11–22.

Mitchell, J. I., Gagné, M., Beaudry, A., & Dyer, L. (2008). The moderating effect of motivation on the relationship between attitude and IT usage. Unpublished manuscript, Concordia University, Montreal.

Morgeson, F. P., & Humphrey, S. E. (2006). The work design questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. Journal of Applied Psychology, 91(6), 1321–1339.

Muraven, M., Rosman, H., & Gagné, M. (2007). Lack of autonomy and self-control: Performance contingent rewards lead to greater depletion. Motivation and Emotion, 31(4), 322–330.

Nonaka, I., von Krogh, G., & Voelpel, S. (2006). Organizational knowledge creation theory: Evolutionary paths and future advances. Organization Studies, 27(8), 1179–1208.

Norton, R. W. (1975). Measurement of ambiguity tolerance. Journal of Personality Assessment, 39(6), 607–619.

O'Dell, C., & Grayson, C. J. (1998). If only we knew what we know: Identification and transfer of internal best practices. California Management Review, 40(3), 154–174.

O'Neill, B. S., & Adya, M. (2007). Knowledge sharing and the psychological contract. Journal of Managerial Psychology, 22(4), 411–436.

O'Reilly, C., & Pondy, L. (1980). Organizational communication. In S. Kerr (Ed.), Organizational behavior (pp. 119–149). Columbus, OH: Grid.

Osterloh, M., & Frey, B. S. (2000). Motivation, knowledge transfer, and organizational forms. Organization Science, 11(5), 538–550.

Park, H., Ribiere, V., & Schulte, W. D. (2004). Critical attributes of organizational culture that promote knowledge management technology implementation success. Journal of Knowledge Management, 8(3), 106–117.

Patterson, R., Gellatly, I., Arazy, O., & Jang, S. (2007). The effects of wiki characteristics on performance quality: The role of user motivations. Proceedings of the Workshop on Information Technologies and Systems, 17.

Piccolo, R. F., & Colquitt, J. A. (2006). Transformational leadership and job behaviors: The mediating role of core job characteristics. Academy of Management Journal, 49(2), 327–340.

Pillai, R., Schriesheim, C. A., & Williams, E. S. (1999). Fairness perceptions and trust as mediators for transformational and transactional leadership: A two-sample study. Journal of Management, 25(6), 897–933.

Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leadership behaviors and their effects on followers' trust in the leader, satisfaction, and organizational citizenship behaviors. Leadership Quarterly, 1(2), 107–142.

Poortvliet, P. M., Janssen, O., Van Yperen, N. W., & Van de Vliert, E. (2007). Achievement goals and interpersonal behavior: How mastery and performance goals shape information exchange. Personality and Social Psychology Bulletin, 33(10), 1435–1447.

Pruitt, D. G., & Kimmel, M. J. (1977). Twenty years of experimental gaming: Critique, synthesis, and suggestions for the future. Annual Review of Psychology, 28(1), 363–392.

Quigley, N. R., Tesluk, P. E., Locke, E. A., & Bartol, K. M. (2007). A multilevel investigation of the motivational mechanisms underlying knowledge sharing and performance. Organization, 18(1), 71–88.

Riege, A. (2005). Three-dozen knowledge-sharing barriers managers must consider. Journal of Knowledge Management, 9(1), 18–35.

Rioux, S. M., & Penner, L. A. (2001). The causes of organizational citizenship behavior: A motivational analysis. Journal of Applied Psychology, 86(6), 1306–1314.

Roca, J. C., & Gagné, M. (2008). Understanding e-learning continuance intention in the workplace: A self-determination theory perspective. Computers in Human Behavior, 24(4), 1596–1604.

Rosen, B., Furst, S., & Blackburn, R. (2007). Overcoming barriers to knowledge sharing in virtual teams. Organizational Dynamics, 36(3), 259–273.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78.

Ryan, R. M., Mims, V., & Koestner, R. (1983). Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. Journal of Personality and Social Psychology, 45(4), 736–750.

Ryan, R. M., Sheldon, K. M., Kasser, T., & Deci, E. L. (1996). All goals were not created equal: An organismic perspective on the nature of goals and their regulation. In P. M. Gollwitzer & J. A. Bargh (Eds.), The psychology of action: Linking cognition and motivation to behavior (pp. 7–26). New York: Guilford Press.

Shamir, B., House, R. J., & Arthur, M. B. (1993). The motivational effects of charismatic leadership: A

self-concept based theory. Organization Science, 4(4), 577–594.

Sheldon, K. M., & Elliot, A. J. (1998). Not all personal goals are "personal": Comparing autonomous and controlling goals on effort and attainment. Personality and Social Psychology Bulletin, 24(5), 546–557.

Sheldon, K. M., & McGregor, H. A. (2000). Extrinsic value orientation and "the tragedy of the commons." Journal of Personality, 68(2), 383–411.

Shore, L. M., Tetrick, L. E., Lynch, P., & Barksdale, K. (2006). Social and economic exchange: Construct development and validation. Journal of Applied Social Psychology, 36(4), 837–867.

Srivastava, A., Bartol, K. M., & Locke, E. A. (2006). Empowering leadership in management teams: Effects on knowledge sharing, efficacy, and performance. Academy of Management Journal, 49(6), 1239–1251.

Thomas, K. W., & Velthouse, B. A. (1990). Cognitive elements of empowerment: An "interpretive" model of intrinsic task motivation. Academy of Management Review, 15(4), 666–681.

Tissen, R., Andriessen, D., & Deprez, L. F. (1998). Value-based knowledge management: Creating the 21st century company: Knowledge intensive, people rich. Amsterdam: Addison-Wesley Longman.

van den Hooff, B., & de Ridder, J. A. (2004). Knowledge sharing in context: The influence of organizational commitment, communication climate, and CMC use on knowledge sharing. Journal of Knowledge Management, 8(6), 117–130.

van Knippenberg, D., & van Schie, E. C. M. (2000). Foci and correlates of organizational identification. Journal of Occupational and Organizational Psychology, 73(2), 137–147.

Wall, T. D., Kemp, N. J., Jackson, P. R., & Clegg C. W. (1986). Outcomes of autonomous workgroups: A long-term field experiment. Academy of Management Journal, 29(2), 280–304.

Wang, C.-C. (2004). The influence of ethical and self-interest concerns on knowledge sharing intentions among managers: An empirical study. International Journal of Management, 21(3), 370–381.

Wright, P. M., George, J. M., Farnsworth, S. R., & McMahan, G. C. (1993). Productivity and extra-role behavior: The effects of goals and incentives on spontaneous helping. Journal of Applied Psychology, 78(3), 374–381.

Wu., T.-Y., Hu, C., Lin, J.-H., & Hsu, Y.-W. (2008, August). Poor leadership and job stress: The moderating effects of coworker support and job characteristics. Paper presented at the Annual Meeting of the Academy of Management, Anaheim, CA.