This study explores how and why people participate in collaborative knowledge-building practices in the context of Wikipedia. Based on a survey of 223 Wikipedians, this study examines the relationship between motivations, internal cognitive beliefs, social-relational factors, and knowledge-sharing intentions. Results from structural equation modeling (SEM) analysis reveal that attitudes, knowledge self-efficacy, and a basic norm of generalized reciprocity have significant and direct relationships with knowledge-sharing intentions. Altruism (an intrinsic motivator) is positively related to attitudes toward knowledge sharing, whereas reputation (an extrinsic motivator) is not a significant predictor of attitude. The study also reveals that a social-relational factor, namely, a sense of belonging, is related to knowledge-sharing intentions indirectly through different motivational and social factors such as altruism, subjective norms, knowledge self-efficacy, and generalized reciprocity. Implications for future research and practice are discussed.

Introduction

The phenomenon of collaborative knowledge building has received growing attention from both researchers and practitioners. With the rapid advancement of computer-mediated communication (CMC) tools (e.g., Web 2.0 applications), knowledge sharing has moved beyond face-to-face exchanges to virtual social contexts such as blogs, shared Web spaces, online forums, social networking sites, Wikipedia, and shared electronic databases (Hoisl, Aigner, Miksch, 2007; Hsu, Ju, Yen, & Chang, 2006; Klamma, Cao, & Spaniol, 2007). Knowledge in this context is not a static object but a public good collaboratively built, shared, and managed by the collective (Kalman, Monge, Fulk, & Heino, 2002). The notion of knowledge management and learning has been geared towards conversational knowledge building, whereby knowledge has become more collaborative and integrated; sharing of knowledge is also open to users and not just experts (Lin, 2007). Although a large pool of active contributors with diverse expertise is crucial to building such a public knowledge good, studies have reported various inherent problems, such as a lack of participation from users and social dilemmas like free riding (Kalman et al., 2002; Wang & Fesenmaier, 2003).

Prior research has identified a variety of factors that influence knowledge sharing and contribution behavior in different computer-mediated environments (CMEs). These include intrinsic and extrinsic rewards (Hoisl, Aigner, Miksch, 2007; Kollock, 1999), social norms (Nov, 2007), social network centrality or network capital (Wasko & Faraj, 2000, 2005), altruism (Nov, 2007), knowledge self-efficacy (Hsu et al., 2006; Kalman et al., 2002), perceived ease of participation and trust (Kim, Na, & Rhu, 2007), and political ideology and idealism pertaining to knowledge sharing (Wagner & Prasarnphanich, 2007). Despite the growing number of studies on knowledge sharing, scholars have often noted that there is a lack of explanation for the underlying social and cognitive processes involved in collaborative knowledge building (Olivera, Goodman, & Tan, 2008; Wasko & Faraj, 2000).
A decline in the number of contributors could reduce the reliability of Wikipedia, which depends on volunteers who write and edit Wikipedia’s Web pages has fallen sharply in recent years (Murad, 2009; Ortega, 2009). A decline in the number of contributors could reduce the reliability of Wikipedia, which depends on volunteers who create pages and check facts. Hence, it is timely and important to explore the key factors that influence Wikipedians to participate in collaborative knowledge-building practices.

Employing the theory of planned behavior (TPB; Ajzen, 1985, 1991) with extensions explicitly made for social, relational, and motivational factors, we developed and tested an integrative research model to explore the theoretical intersections among motivations, internal cognitive beliefs, and social-relational factors pertaining to knowledge-sharing intentions. More specifically, we sought to (a) determine the key motivational and social antecedents to knowledge-sharing intentions and (b) examine how these factors are theoretically linked to the central constructs associated with TPB, such as attitudes, subjective norms (SN), behavioral control beliefs, and behavioral intentions (BI). In doing so, we aimed to reveal the underlying social and cognitive processes involved in collaborative knowledge building in virtual environments. It was also our intent to extend the standard TPB formulation to account for the individual and collective aspects of knowledge-sharing behavior in CMEs. To address these research topics, we used empirical data from a Web-based survey of 223 Wikipedians. This study presents the results from testing our hypotheses using structural equation modeling (SEM), and concludes with a discussion of the findings and implications for future research and practice.

Literature Review

Theory of Planned Behavior

We selected TPB (Ajzen, 1985) and its theoretical antecedent, the theory of reasoned action (TRA; Ajzen & Fishbein, 1980), for our basic research framework, because these offer robust and parsimonious explanations for the theoretical relationships among beliefs, attitudes, and intentions pertaining to various human behaviors, including knowledge sharing (Bock et al., 2005; Lin & Lee, 2004; Ryu, Ho, & Han, 2003). TRA assumes that behavior (B) is directly determined by the intention to perform the behavior (BI), which in turn is primarily determined by two factors: attitudes (A) toward the behavior, and subjective norms (SN; Ajzen & Fishbein 1980). It is assumed that people process all available information and deliberately consider the implications and consequences of their behaviors before they take an action. The theory further posits that behavior is also influenced by social and normative beliefs (SN) to the extent that persons will perform a behavior in question when they think that most of the referents with whom they are motivated to comply would approve such a behavior.

Ajzen (1985) proposed TPB to encompass both nonvolitional and volitional behaviors to enhance the predictive capability of the theory. TPB contains an additional component called perceived behavioral control (PBC), which refers to “the perceived ease or difficulty of performing the behavior” (Ajzen, 2002, p. 665). TPB predicts that people who believe that they do not have the skills or the resources to perform a certain behavior are unlikely to form a strong BI to engage in it even if they hold a favorable attitude toward the behavior. As such, TPB postulates a direct link between PBC and BI (Ajzen, 1985). The theory also posits that PBC has a direct link to actual behavior, because the performance of a behavior depends not only on motivation, but also on perceived adequate control over the behavior in question.

Both TRA and TPB have been extensively used to predict and explain various behaviors in social psychology (Armitage & Conner, 2001) and in the adoption of information systems (Luarn & Lin, 2005; Taylor & Todd, 1995). In the knowledge-sharing context, these theories have been employed to examine the knowledge-sharing behavior of physicians in hospitals (Ryu, Ho, & Han, 2003), managers in Korea (Bock et al., 2005), and senior managers in Taiwan (Lin, 2007; Lin & Lee, 2004). The findings of these studies generally confirm the explanatory power of the theories such that the BI to share knowledge is determined by key constructs of TRA and TPB such as attitude, SN, and PBC. More specifically, studies have revealed that people are more likely to share knowledge when they perceive it to be valuable and enjoyable (Lin, 2007), thus supporting the utilitarian perspective of knowledge sharing. Studies have also found that knowledge exchange is inherently a social and collective action, and it is, thereby, influenced by surrounding social norms and contextual factors such as SN (Lin & Lee, 2004) and organizational climates (Bock et al., 2005).

Knowledge Sharing in Virtual Environments

Knowledge-sharing behavior in a virtual environment is defined as the behavior of disseminating one’s acquired knowledge to other distributed members using CMC tools as a means of information exchange (Wasko & Faraj, 2005). Researchers have argued that knowledge sharing in virtual
contexts is deeply intertwined with social, relational, and technological factors, requiring a more holistic approach to better understand this social behavior (Wasko & Faraj, 2005). Knowledge sharing occurs within a distributed online environment that is networked, digital, and full of information (Kollock, 1999; Olivera et al., 2008). Members in these social environments consist of a larger, loosely knit, geographically distributed group of people who often exchange information with “electronic weak ties” (Constant, Sproull, & Kiesler, 1996) without apparent external reward. These characteristics render important changes in the production/contribution function of knowledge as a public good (Kalman et al., 2002).

Consequently, a number of studies have examined various sociopsychological, technological, and contextual factors that influence knowledge sharing in distributed environments such as online communities of practice (Ardicvili et al., 2003; Wasko & Faraj, 2000, 2005), Wikipedia (Hoisl et al., 2007; Moore & Serva, 2007), online games (Choi et al., 2007), and video-sharing communities (Kim, Na, & Ryu, 2007). Different perspectives, such as the utilitarian/rational actor and normative/relational perspective, have been applied to understand the knowledge-sharing behavior in CMEs. Using social exchange theory (Blau, 1964), for instance, many scholars have posited that individuals engage in this type of social interaction (i.e., knowledge sharing) based on a utilitarian expectation that their contributions/participation will lead to both extrinsic and intrinsic rewards. Kollock (1999) postulated that the contribution of information to virtual communities is driven by four types of egoistic motivational factors, such as anticipated reciprocity, reputation, a sense of efficacy, and attachment to a community. Wasko and Faraj (2000, 2005) categorized motivational factors into tangible (extrinsic) returns such as personal gain, a search for answers, and valuable information, and intangible (intrinsic) returns such as enjoyment and social interaction with other community members. Other researchers have also demonstrated that extrinsic motivations (status and reputation) and intrinsic motivations (enjoyment and creativity) have significant effects on the intention to participate in video-sharing online communities (Kim, Na, & Ryu, 2007), online discussion forums (Yang, Li, Tan, & Teo, 2007), Wikipedia communities (Hoisl et al., 2007; Moore & Serva, 2007; Nov, 2007), and online travel communities (Wang & Fesenmaier, 2003).

Researchers have also postulated that knowledge sharing is deeply embedded in social contexts, and that social and relational factors play a significant role in shaping attitudes and BI pertaining to knowledge sharing. Wasko and Faraj (2000, 2005) found that individuals occupying central positions in community social networks are more likely to be active contributors. Studies have also found that individuals are more willing to contribute knowledge when they have a high level of community attachment or a sense of belonging (Haythornthwaite, Guzic, Robins, & Shoemaker, 2000). Similarly, altruistic or humanistic concerns for others are significant factors that motivate knowledge sharing (Nov, 2007; Wagner & Prasarnphanich, 2007). Additionally, studies have found that the intention to share knowledge online is influenced by situational as well as technological factors such as a noncompetitive, relaxing setting (Khe & Hara, 2006), perceived ease of participation and trust (Kim, Na, & Rhu, 2007), system quality confirmation and expectations, and Web site use expectations (Chen, 2007).

Hypotheses and Research Model

As reviewed above, previous research has primarily focused on identifying the numerous factors that affect knowledge-sharing behavior both online and offline. To deepen our understanding of knowledge sharing in CMEs, the present study proposes an integrative research model that specifies the underlying mechanism by which key sociopsychological factors influence knowledge-sharing intentions. As Figure 1 shows, we first tested the utility of the original TPB model in predicting knowledge-sharing intentions (BI) by examining the relative degree of influence of key TPB constructs on BI. Subsequently, we modeled how key motivational (i.e., intrinsic and extrinsic motivators) and social (generalized reciprocity and a sense of belonging) factors were selectively linked to the central TPB constructs. In doing so, we explored whether these key factors had direct effects on BI or indirectly affected BI through their impact on different types of beliefs (i.e., behavioral, normative, and control beliefs). A test of these multiple theoretical routes would reveal the mediating mechanisms involved in the process of collaborative knowledge building. Note that we chose BI as the main endogenous variable in this research model. Many studies have confirmed a strong correlation between BI and actual behavior (Ajzen & Fishbein, 1980; Ryu et al., 2003; So & Bolloju, 2005; Venkatesh & Davis, 2000). Likewise, studies have employed knowledge-sharing intentions as a reliable indicator of actual knowledge-sharing behavior (Lin, 2007; Ryu et al., 2003; So & Bolloju, 2005).

Testing the Utility of TPB: Attitude, SN, PBC, and BI

Attitude. As postulated by TPB and TRA, attitudes toward behavior are the primary determinant of BI (Ajzen, 1985). An individual’s decision to take an action is determined by his or her cognitively mindful assessment of the target behavior and its outcomes. In this study context, attitude refers to the positive or negative feelings derived from knowledge sharing. Many studies have confirmed the positive relationship between attitude and BI in the knowledge-sharing context (Bock et al., 2005; Lin, 2007). Hence, to further test the robustness of this facet of the theoretical framework and apply it to the context of this study, we predicted the following:

H1: Attitude will be positively associated with BI.

Subjective norms (SN). Given that knowledge sharing is an inherently collective action (Bock et al., 2005), many researchers assume that an individual’s intention to share knowledge is strongly affected by social influences such as
SN (Lin & Lee, 2004; Ryu, Ho, & Han, 2003; So & Bolloju, 2005). Both TRA and TPB assume that SN can influence BI both directly and indirectly (Likert & Sindi, 1997). Direct influence can occur through a compliance process, whereby individuals undertake certain actions to comply with referent others to obtain social rewards or to avoid social disapproval (Malhotra & Galletta, 2005). Scholars have also argued that SN can influence BI through its impact on attitude via internalization and identification processes (Bock et al., 2005; Lewis et al., 2003; Venkatesh & Davis, 2000). Internalization occurs when one incorporates social influence (the referent’s beliefs) into one’s own belief structure. Conceptually, it is similar to informational social influences, where an individual accepts the influence of others because he or she believes information from the influencing agent to be accurate or credible (Deutsch & Gerad, 1955). The influence of SN via identification occurs when an individual accepts influence and subsequently changes his or her beliefs and attitudes to establish or maintain a satisfying self-defining relationship with important others. Taken together, the literature suggests that SN influences BI directly through the compliance effect and indirectly via its impact on BI through internalization or identification. Hence, we predicted the following:

H2a: SN will be positively related to attitude.
H2b: SN will be positively related to BI.

Perceived behavioral control (PBC). PBC considers the constraints, resources, and opportunities that may impede or enhance one’s ability to execute an action (Ajzen, 1985). Studies have shown that PBC comprises two subordinate constructs: self-efficacy and controllability (Ajzen, 2002; Armitage & Conner, 1999; Manstead & van Eeckelen, 1998). Self-efficacy is concerned with judgments of how well one can execute courses of action required to deal with prospective situations (Bandura, 1995). It plays a central role in the cognitive regulation of BI as individuals regulate the level and the distribution of effort they will expend in accordance with the effects they are expecting (Bandura, 1995). In the context of collective action such as knowledge sharing, self-efficacy refers to an individual’s self-assessment that his or her own participation will make a difference in the collective action’s success (Kerr, 1992; Oliver, 1993). In the knowledge-sharing context, many scholars have focused on a particular type of self-efficacy, called knowledge self-efficacy (Kalman et al., 2002; Lin, 2007), which refers to the degree to which one is confident that his or her knowledge can improve the work process, resolve job issues, or be useful to knowledge recipients (Constant et al., 1996; Hsu et al., 2006). Lack of knowledge self-efficacy is a major barrier to participation in knowledge-sharing virtual communities, as “people are afraid that what they post may not be important (may not deserve to be posted), or may not be completely accurate, or may not be relevant to a specific discussion” (Ardichvil, Page, & Wentling, 2003, p. 70). Taken together, the literature suggests that individuals will be more inclined to contribute knowledge when they believe they have the competence to offer knowledge that is useful and relevant to others. Hence:

H3: Knowledge self-efficacy will be positively related to BI.

Controllability refers to beliefs about the extent to which performing a behavior is up to the actor (Ajzen, 2002).
Researchers often distinguish between controllability and self-efficacy, assuming there are key differences between possessing coping skills (i.e., efficacy), and being able to effectively and consistently use them under difficult circumstances (i.e., controllability). That is, success requires not only skills, but also a strong self-belief in one’s capability to exercise personal control. Compared with self-efficacy beliefs, which are said to reflect internal factors concerning people’s confidence, controllability beliefs are assumed to deal with external factors such as time and external resources (e.g., Armitage & Conner, 1999; Manstead & van Eekelen, 1998).

Several studies have shown the significant impact of controllability on knowledge sharing in the offline knowledge-sharing context (Lin & Lee, 2004; Ryu, Ho, & Han, 2003; So & Bolloju, 2005). Hence, it is logical to predict that controllability and knowledge-sharing intentions will be positively associated in virtual environments as well. In other words, if a person feels that he or she has complete control over the success of knowledge sharing, that person is more likely to contribute knowledge to Wikipedia. Thus, we predicted as follows:

**H4:** Controllability will be positively related to BI.

**Integrating Motivational and Social-Relational Factors**

**Extrinsic motivation: Reputation.** From an extrinsic motivational perspective, individual behavior is driven by the perceived value of the action and the anticipated rewards to be derived from it. Assuming individuals to be calculative, this perspective posits that an individual actor will choose the course of action that maximizes utility (receiving organizational or social rewards) in a given and stable set of preferences. Status, reputation, power, acceptance, and glory are associated with the concept of social rewards and have been found to have significant effects on contribution behavior in a virtual community (Hoisl, Aigner, & Miksch, 2007).

Reputation is an important asset that an individual can leverage to achieve and maintain status within a collective (Jones, Hesterly, & Borgatti, 1997). Results from prior research on electronic networks of practice provide evidence that building a reputation is a strong motivator for action participation (Donath, 1999) and information sharing (Lakhani & von Hippel, 2003). Because Wikipedia displays the ranking of the top contributors for a certain period, contributing content may be perceived as a kind of prestige and recognition for the contributors. They will feel honored and thus derive pleasure from gaining a reputation in the community when they are ranked highly for their contribution. Thus, we posited that anticipated extrinsic rewards (i.e., reputation) would encourage a more positive attitude toward knowledge sharing:

**H5:** Reputation will be positively related to attitude.

**Intrinsic motivation: Altruism.** Several researchers have argued that virtual communities also cultivate a “gift culture,” whereby netizens provide their information to others whom they may never meet again (Wang & Fesenmaier, 2003). This is known as altruistic or prosocial behavior, which is behavior that is performed without expecting any future reward and is carried out mainly to benefit others (Heckhausen, 1991). This is particularly relevant to Wikipedia, whereby members usually volunteer to edit and contribute content even when they are not rewarded financially or tangibly. That is, individuals may contribute knowledge in virtual communities because they perceive that helping others with challenging problems is interesting, and because it feels good to help other people (Kollock, 1999). This enjoyment derived from helping others can be linked to the intrinsic motivation of the self-determination theory (Deci & Ryan, 2000). Intrinsic motivation refers to engaging in an activity for its own sake, out of interest, or for the pleasure and satisfaction derived from the experience (Deci & Ryan, 2000). This positive feeling or the enjoyment of helping others should be closely linked to attitudes toward knowledge sharing. In studies on the motivations to contribute to Wikipedia, Wagner and Prasarnphanich (2007) and Nov (2007) have found that altruism or humanistic concern for others is a significant factor that induces knowledge-contributing behavior. Therefore, we posited that:

**H6:** Altruism will be positively related to attitude.

**Sociorelational and normative factors.** Studies have argued that when individuals are influenced by their social context, especially where unspecified cooperative outputs such as knowledge are exchanged, the social exchange relationship plays a crucial role in shaping their attitudes and behavior (Blau, 1964; Constant et al., 1996; Organ & Konovsky, 1989). Thus, besides SN, which is a central component of TPB, this study also focused on two additional social/normative factors—generalized reciprocity and a sense of belonging—and examined how these are interlinked to knowledge-sharing attitudes and behavior.

**Generalized reciprocity.** In the context of Wikipedia, contributors may provide content since they wish to repay other contributors, or they expect others will provide content in response to their own contributions. Organ and Konovsky (1989) argued that social exchange (e.g., knowledge sharing) differs from economic exchange, as it engenders diffused, unspecified obligations. This is explained by the concept of generalized reciprocity, whereby a person who has gained something from another individual feels inclined to give something back in return in order to sustain ongoing supportive exchanges (Kolm, 2000; Wasko & Faraj, 2005). The underlying assumption is that a gift transaction usually involves an unstated obligation to repay the gift at some future time (Carrier, 1991). This kind of mentality is related to a sense of fairness in online knowledge-sharing communities (Wasko & Faraj, 2000, 2005).

Those who are operating out of a desire for fairness and reciprocity are likely to believe that knowledge sharing is...
valuable and worthwhile and to have a positive attitude toward knowledge sharing (Huber, 2001). They are also likely to believe that their efforts to contribute knowledge will be reciprocated, thereby rewarding individual efforts and ensuring ongoing contributions. Therefore, we hypothesized the following:

**H7a:** Generalized reciprocity will be positively related to attitude.

A norm of reciprocity is related to a sense of mutual indebtedness and obligation (Portes, 1998; Putnam, 1993). Even though exchanges in distributed environments occur through weak ties between strangers, there is evidence of reciprocal supportiveness and mutual obligation (Wasko & Faraj, 2000; Wellman & Gulia, 1999). When a strong norm of reciprocity exists in the collective, individuals may feel collective social pressure to the effect that favors given and received from others should be reciprocated. That is, individuals may perceive reciprocity as a moral obligation or normative social pressure and, thus, be inclined to contribute knowledge, even though they themselves may not have a favorable attitude toward knowledge contribution. Unlike the utilitarian perspective stated above, this normative perspective of knowledge sharing emphasizes the notion that behavioral intention can be directly induced by social norms or normative beliefs (Bock et al., 2005). Hence, we predicted that generalized reciprocity would have a direct link to knowledge-sharing intentions:

**H7b:** Generalized reciprocity will be positively related to BI.

**A sense of belonging.** Staw (1984) used expectancy theory to build an altruistic motivational model of individual choice in a collective action. The model incorporates a term for identification, “the perception of oneness and belongingness” (Ashforth & Mael, 1989), to indicate the value that individuals place on collective gain. Studies have demonstrated that this sense of belonging promotes cooperation in social dilemmas (Bonacich & Schneider, 1992) and, in particular, in information sharing using a shared electronic database (Kalman et al., 2002). Similarly, Wenger (1998) stated that spreading information in a community of practice is a form of engagement and declaration of allegiance to that community. Linking this concept to knowledge-sharing behavior could explain the likelihood that individuals will have a positive attitude toward sharing knowledge with other members (even strangers) when they see everyone as part of the collective, and when all have a collective goal orientation (Leana & Van Buren, 1999). Thus, we hypothesized the following:

**H8a:** A sense of belonging will be positively related to attitude.

Although most studies have examined the direct effect of a sense of belonging on knowledge-sharing behavior (Haythornwaite et al., 2000; Wasko & Faraj, 2000, 2005), we posited that this factor should be closely interlinked to other cognitive and social factors rather than being an independent source of influence. As such, we predicted that a sense of belonging would have strong effects on other motivational factors, beliefs, and social factors such as reciprocity, altruism, and knowledge self-efficacy.

Research has shown that when members have a strong identification with a collective, they are more likely to perceive an obligation to participate in it (Coleman, 1990; Putnam, 1995) and to recognize and abide by its social norms (i.e., SN), that is, normative beliefs surrounding the behavior in question (SN) become more salient to individuals when they have a strong sense of belonging. As individuals feel more attachment to other members in a given collective setting, they will also feel a greater obligation to the effect that favors given to and received from them should be reciprocated. Thus, individuals will have a stronger sense of moral obligation to pay back to the community (i.e., generalized reciprocity) based on shared membership (Wasko & Faraj, 2000, 2005). Similarly, individuals will believe that helping others is more enjoyable and valuable (i.e., altruism) when they have a strong sense of attachment to other members in a community. Because individuals have strong attachment to or social bonding with other members in a community, they are more likely to be motivated to share knowledge based on altruism. Finally, we also predicted that a sense of belonging would have a positive association with knowledge self-efficacy belief. Individuals are likely to believe that they can better understand how their expertise is relevant to other community members and are, thus, more apt to share valuable knowledge with others when they perceive that they (both information contributors and recipients) belong to the same community. We suggested that individuals should be more confident in their ability to contribute more useful information to others when they perceive that others (knowledge recipients) share common interests and collective goals with them. Thus, taken together, we predicted the following:

**H8b, c, d, e:** Membership will be positively associated with SN (H8b), generalized reciprocity (H8c), altruism (H8d), and knowledge self-efficacy (H8e).

**Method**

**Sample and Data Collection**

We collected the data for this study using a Web-based survey that was disseminated to Wikipedians who had signed up as members of the Wikipedia community. Respondents were recruited from the list of Wikipedians in the United States and Singapore. We chose the U.S. sample because contributors from the United States form the majority of English Wikipedia contributors. We additionally chose Singapore to have a sample from a different culture. Singapore’s official language is English, and its education level, economic conditions, and infrastructure relating to information and communication technologies (ICTs) are equivalent to those in the United States (Tan, Watson, Clapper, & Mclean, 1998).

Under the category of the United States and Singapore English Wikipedia member lists, 1,020 members had
functioning e-mail options. We e-mailed a request to all of these to participate in a Web-based survey. Beyond merely contributing content, these members had created personal user pages and therefore may have been more committed to contributing, though not all were active contributors. We collected 223 survey responses, yielding a response rate of 21.8%. A comparison between U.S.-based and Singapore-based Wikipedian members displayed no significant differences in all central constructs of the study. Because the study did not focus on cross-national differences, we combined the two samples for subsequent data analysis.

The respondents’ ages ranged from 18 to 70. The largest age group was between 21 and 30, accounting for 28.3% \((n = 63)\) of the total number of respondents. Most respondents had tertiary education \((n = 166; 74.4\%)\). Of the respondents, 87% were male \((n = 194)\) and 12% were female \((n = 26)\). Sixty-eight percent \((n = 153)\) were U.S. citizens, 11% \((n = 24)\) were Singaporeans, while the remaining respondents \((n = 38)\) came from different countries such as those of Europe. Approximately 50% added new content between one and four times approximately each month, while 30% added no new content at all. Many respondents (44%) had been using the Internet for more than 11 years. The largest proportion (69%) of the respondents indicated that they had been a member of Wikipedia between 1 and 3 years.

**Measurements**

The survey comprised 51 questions altogether. Most survey items were adapted from prevalidated research work to increase the construct validity of the survey items. We used a 5-point semantic differential scale to measure attitudes toward knowledge sharing. A 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree) measured other central constructs.

**Central constructs of TPB.** We measured attitude toward knowledge-sharing behavior by four items adapted from Lin (2007), which assessed the extent to which the respondents found knowledge sharing with other Wikipedians pleasant, good, valuable, and beneficial. SN was assessed by three survey items adapted from Venkatesh and Davis (2000), which gauged the extent to which individuals thought they should contribute knowledge because their referent others thought they should do so. Three items, adapted from Lin (2007), assessed knowledge self-efficacy, which measured the extent to which respondents felt confident in contributing valuable knowledge. We measured controllability by four items adapted from prevalidated scales (Loh, Hua, Tan, & Detenber, 2006; Taylor & Todd, 1995), which determined the extent to which individuals thought that editing and adding new content were entirely within their control. Finally, we used four items adapted from Lin (2007) and Ryu, Ho, and Han (2003) to measure an individual’s intention to contribute knowledge; these assessed the degree to which individuals intended to contribute, add, or edit content on Wikipedia.

**Motivational factors.** We used three items adapted from Wasko and Faraj (2000) to measure recognition/reputation and developed one item independently. These four items assessed the degree to which individuals thought that knowledge sharing would improve one’s status and enhance one’s reputation. Altruism was assessed by two items adapted from Lin (2007), which determined the degree to which individuals enjoyed helping others via knowledge sharing.

**Social/relational/normative factors.** We measured generalized reciprocity using four survey items adapted from preexisting scales (Constant et al., 1996; Lakhani & Wolf, 2005). The items included the degree to which individuals felt a personal obligation to contribute knowledge, and expected others to help. Four survey items adapted from Koh and Kim (2004) were used to assess a sense of belonging; these measured the degree to which individuals felt a sense of belonging and to which the respondent thought other Wikipedians were his or her close friends.

Table 1 presents the actual survey items, their reliability metrics, and some descriptive statistics. Note that two items for controllability were removed from the final measurement model because subsequent results from confirmatory factor analysis (CFA) indicated that these items displayed low factor loadings with their corresponding latent factor. The two items measured the extent to which individuals felt that they had enough time and Internet access to contribute knowledge. We assumed that these items were less important in this study context, considering the sample characteristics described above. We calculated Cronbach’s alpha for each final scale as a reliability metric. All scales except for altruism had reliability coefficients exceeding the acceptance norm of 0.70 (Nunally & Bernstein, 1994). Subsequent CFA showed that the items used to measure altruism had sufficient factor loadings with their latent factor. Hence, we used the scale for subsequent data analysis.

**Results**

We analyzed the data collected from the survey responses using structural equation modeling (SEM), which allows researchers to perform pathanalytic modeling with latent variables. The software package we used was AMOS 16, a covariance-based SEM tool. The first step in the model testing was to examine the research model’s goodness of fit and find evidence for the validity of the measurement model. First, we tested the hypothesized research model shown in Figure 1. The results of the SEM analysis showed that the chi-square statistics were significant \((p < 0.001)\). We also found that the model had an inadequate fit as indicated by various alternative goodness-of-fit indices. More specifically, the comparative fit index (CFI; 0.686), the incremental fit index (IFI; 0.747), the root mean square error of approximation (RMSEA; 0.080), and the ratio of chi square to degrees of freedom (2.428) were all below acceptable thresholds of goodness of fit.

In short, the results suggested that the research model should be modified in two ways. First, as noted earlier,
TABLE 1. Descriptive statistics for measures.

<table>
<thead>
<tr>
<th>Variables and Survey items</th>
<th>M</th>
<th>SD</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>4.20</td>
<td>0.64</td>
<td>0.82</td>
</tr>
<tr>
<td>Knowledge sharing with other Wikipedians is …</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. very unpleasant…very pleasant.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. very bad…very good.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3. very worthless…very valuable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. very harmful…very beneficial.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral intention (BI)</td>
<td>4.00</td>
<td>0.62</td>
<td>0.86</td>
</tr>
<tr>
<td>I intend to share knowledge with Wikipedians.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I will make an effort to share knowledge with Wikipedians.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I intend to edit contents on Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I intend to add new contents to Wikipedia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective norms (SN)</td>
<td>2.55</td>
<td>0.77</td>
<td>0.79</td>
</tr>
<tr>
<td>People who are important to me think I should contribute to Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People who are important to me contribute to Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People who can influence me think I should contribute to Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge self-efficacy</td>
<td>3.83</td>
<td>0.71</td>
<td>0.72</td>
</tr>
<tr>
<td>I am confident in my ability to provide knowledge that others in Wikipedia consider valuable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have the expertise required to provide valuable knowledge for Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It makes a difference whether I share my knowledge in Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controllability</td>
<td>3.98</td>
<td>0.93</td>
<td>0.91</td>
</tr>
<tr>
<td>Adding new contents to Wikipedia is entirely within my control.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Editing the contents on Wikipedia is entirely within my control.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reputation/recognition</td>
<td>2.95</td>
<td>0.87</td>
<td>0.81</td>
</tr>
<tr>
<td>I earn respect from others by contributing my knowledge.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel that contributing my knowledge improves my status in Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I contribute my knowledge to enhance my reputation in Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I contribute my knowledge to improve my ranking in Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altruism</td>
<td>4.20</td>
<td>0.53</td>
<td>0.60</td>
</tr>
<tr>
<td>I enjoy helping others by sharing my knowledge.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It feels good to help someone by sharing my knowledge.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A norm of general reciprocity</td>
<td>3.67</td>
<td>0.80</td>
<td>0.85</td>
</tr>
<tr>
<td>I expect other Wikipedians to help me, so it’s only fair for me to help them by contributing my knowledge.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel a personal obligation to contribute my knowledge because I use knowledge from Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If I receive useful knowledge from the Wikipedia, I should provide useful knowledge to others in return.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to do everyone good on the Wikipedia if I am being helped by others’ contributions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense of belonging</td>
<td>2.84</td>
<td>0.75</td>
<td>0.77</td>
</tr>
<tr>
<td>I feel as if I belong to Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel membership in Wikipedia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel as if other Wikipedians are my close friends.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like other Wikipedians.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

M = mean; SD = standard deviation.

we had found that two items of controllability had very low factor loadings (<0.40) with their latent factor, suggesting that these items should be removed. Second, the initial results showed that some of our hypothesized paths were not significant. More specifically, the hypothesized paths between five of the constructs (SN [H2a], controllability [H4], reputation [H5], general reciprocity [H7b], and membership [H8a]) and attitude were not statistically significant (p < 0.05). In general, models can be trimmed or built based on theoretical and/or empirical standards (Kline, 2004), and so we removed the nonsignificant paths found in this initial stage from subsequent data analysis.

In the second model specification step, we removed all nonsignificant paths to improve the model fit, as well as the two items for controllability since their factor loadings were below the 0.50 benchmark (Hair, Anderson, Tatham, & Black, 1998). This model specification significantly improved our final model. The results of SEM analysis showed that the chi-square statistics remained significant for the global model ($\chi^2(241) = 444.1, \ p < 0.001$), indicating that the fit of the data to the hypothesized model was not entirely adequate. However, the appropriateness of chi-square testing for model fitting is routinely questioned owing to its sensitivity to sample size and model complexity (e.g., Bollen & Long, 1993; Byrne, 2001). As such, many researchers believe that with a reasonable sample size (e.g., >200) and good approximate fit as indicated by other alternative model fit tests (e.g., adjusted goodness-of-fit index [AGFI], CFI, IFI, and RMSEA), the significance of the chi square test may be discounted (Byrne, 2001; Hair et al., 1998). As Figure 2 shows, the results of SEM analysis revealed an acceptable fit for the research model as indicated by various alternative goodness-of-fit indices. More specifically, the AGFI, CFI, IFI, RMSEA, and ratio of chi-square to degrees of freedom were all within...
acceptable thresholds of goodness of fit. The 0.834 AGIF was slightly below 0.90 but well above the 0.80 benchmark (Hair et al., 1998). The 0.062 RMSEA was slightly higher than the suggested 0.05 benchmark (Byrne, 2001) but within an acceptable range, which is below the cut-off level of 0.08 recommended by Browne and Cudeck (1993). Note that all items in the latent factors exhibited factor loadings above the 0.50 benchmark (Hair et al., 1998) and had significant p values at the 0.001 level, thus affirming the construct validity of the measurement model.

The final step in the model estimation was to examine the significance of each hypothesized path. Figure 2 provides the results. All the paths shown in the revised research model were significant at either the 0.01 or 0.05 level. More specifically, attitude ($\beta = 0.342, p < 0.001$), generalized reciprocity ($\beta = 0.210, p < 0.01$), and knowledge self-efficacy ($\beta = 0.495, p < 0.001$) had significant direct associations with BI, and, hence, the results supported H1, H3, and H7b. Altruism, conceptualized as intrinsic motivation, was significantly related to attitude ($\beta = 0.603, p < 0.001$), and, hence, H6 was supported. In addition, as predicted, a social factor—a sense of belonging—had significant associations with SN ($\beta = 0.477, p < 0.001$), altruism ($\beta = 0.552, p < 0.001$), generalized reciprocity ($\beta = 0.316, p < 0.001$), and knowledge self-efficacy ($\beta = 0.416, p < 0.001$); hence, H8b, H8c, H8d, and H8e were also supported. Note that the final model included the nonsignificant path between SN and BI because it was approaching a marginal significance ($\beta = 0.121, p = 0.087$). In sum, of the 14 hypotheses, 8 were supported and 6 were rejected.

**Discussion**

This study aimed to deepen our understanding of knowledge-sharing behavior in CMEs by examining the theoretical relationships between key cognitive and social factors in the context of Wikipedia. We (a) examined a number of important motivational (reputation and altruism) and social/normative (general reciprocity and a sense of membership) factors, (b) explored their theoretical relationships with the central constructs associated with the TPB research model, and (c) extended the standard TPB formulation to account for the individual (motivational) and collective (social/normative) aspects of knowledge-sharing behavior. We believe that each of these points represents a significant contribution to our understanding of why and how individuals engage in collaborative knowledge-building practices in distributed virtual environments. More specifically, we believe that this study provides important findings about and insights into knowledge-sharing behaviors as follows.

**Extension of TPB**

The results provide partial support for a TPB-based research model of knowledge sharing. In short, most of the hypothesized paths among the central constructs of TPB were significant. The findings indicate that TPB can be a potentially useful theoretical model to explain the ways in which knowledge sharing is induced by behavioral beliefs (attitude) and control beliefs (PBC). More specifically, the study found that attitude toward knowledge sharing has a direct and positive link to BI. Of the two subordinate constructs of PBC, namely,
self-efficacy and controllability, knowledge self-efficacy was found to have a significant association with BI. Consistent with previous studies (Hsu et al., 2006), the study’s findings show that individuals are more inclined to share knowledge when they are confident that they have knowledge useful to the group and that their contributions are likely to make a positive difference to the group. Overall, the findings concur with the central premise of TPB that an individual’s decision to engage in an action is strongly determined by his or her cognitively mindful assessment of the target behavior and its outcomes.

However, the paths between SN and BI and between SN and attitudes were not statistically significant. Although we found only nonsignificant results regarding SN, the findings were not so surprising because other studies have often shown that SN does not exert a direct normative impact on BI when the behavior in question is voluntary as opposed to mandatory (Venkatesh & Davis, 2000). Findings from meta-analyses, collapsing research across different behavioral domains and populations, have also consistently suggested that the ability of the SN construct to predict intention is limited (e.g., Armitage & Conner, 2001). Given that there are a variety of social influences (Kraut, Rice, Cool, & Fish, 1998), it is important for scholars to explore whether alternative types of social influences (e.g., a basic norm of generalized reciprocity) are operating in the process of collaborative knowledge-building practices (see below for further discussion).

The insignificant path between controllability and BI is also noteworthy. The finding suggests that of the two subordinate constructs of PBC, self-efficacy plays a more primary role than controllability in explaining knowledge-sharing intentions. In fact, a meta-analysis of PBC (Cheung & Chan, 2000) showed that only a small number of studies testing TPB used questions related to controllability. Most studies employed self-efficacy only, assuming that it alone could well represent the effect of control beliefs on behavior. Among the existing studies that have encompassed the two subordinate constructs of PBC, some have claimed that self-efficacy is superior to controllability in predicting intention and behavior (Trafimow, Sheeran, Conner, & Finlay, 2002), whereas others have shown the opposite (Rhodes & Courneya, 2003). Ajzen (2002) assumed that the mixed results might be the result of different situations across different studies. Although the current study suggests the primacy of self-efficacy over controllability in the context of Wikipedia, future research may further examine which of these dimensions of PBC plays a more important role in different types of knowledge-sharing contexts.

Overall, the findings provide partial support for TPB. Although some hypothesized links in the original TPB were supported, other central constructs in the theory (SN and controllability) displayed nonsignificant associations with their exogenous factors. As shown in Figure 2, the results show that other motivational and social factors had significant and positive associations with attitude and BI pertaining to knowledge sharing. As such, the findings suggest that the standard TPB formulation could be further extended by integrating these important factors into a research model, allowing us to better account for both the individual (motivational) and collective (social/normative) aspects of knowledge sharing (see below for further discussion).

Integrating Motivational Factors: Intrinsic Versus Extrinsic Motivations

We found that an intrinsic motivational factor, altruism, was significantly associated with attitudes toward knowledge sharing on Wikipedia. Because Wikipedia does not provide contributors any monetary benefit or reward, people who do contribute will logically be those who do so out of goodwill to help others who need particular knowledge or to fill in certain knowledge gaps. As reflected by the study’s findings, a mentality that one is able to help answer other people’s questions leads to a positive attitude toward the act of knowledge sharing in the context of Wikipedia. This is consistent with the results of previous studies (Lin, 2007; Nov, 2007; Wagner & Prasarnphanich, 2007), which showed that altruism is one of the strongest motivators among other variables such as fun, understanding, enhancement, and so forth.

On the other hand, reputation, an extrinsic motivator, was not significantly associated with attitude. Although the finding does not support our hypothesis, this particular result is not so surprising in that it is consistent with previous research illustrating the point that extrinsic motivators have negligible effects on knowledge sharing (Bock & Kim, 2002; Kwok & Gao, 2005). Taken together, the findings indicate that intrinsic rather than extrinsic motivation plays a relatively more important role in shaping attitudes toward knowledge sharing. Although this study examined only two types of intrinsic and extrinsic motivational factors (see the Limitation section for further discussion), the findings concur with previous studies on knowledge sharing that emphasized the critical role of intrinsic motivation in inducing voluntary knowledge-sharing behavior within organizations (Lin, 2007) as well as online communities (Kollock, 1999).

Social Aspects of Knowledge Sharing: A Sense of Belonging and Generalized Reciprocity

The study also found that a norm of generalized reciprocity had a positive and direct link to BI. Although knowledge sharing in CMEs takes place in relatively more diffused and distributed social settings, people can still have a strong sense of generalized reciprocity (Wasko & Faraj, 2000). The direct path from such reciprocity to BI indicates that individuals tend to perceive it as an obligation or mutual indebtedness. In other words, individuals are inclined to contribute knowledge since they feel normative social pressure to pay back favors they have received from general others. Findings from previous studies have also shown that individuals participate in electronic networks of practice owing to a perceived moral obligation to pay back the network and the profession as a whole (Wasko & Faraj, 2000).
However, we found that the relationship between generalized reciprocity and attitude was not significant. The nonsignificant path between generalized reciprocity and attitude and the significant path between generalized reciprocity and BI suggest that this perceived normative pressure induced knowledge-sharing intentions even when individuals themselves may not have had a positive attitude toward knowledge sharing. This finding is consistent with previous studies that have highlighted the crucial role of normative commitments and social obligation in influencing social exchange or collective behaviors (Portes, 1998; Putnam, 1993). In other words, a favorable attitude toward a behavior is not a necessary or sufficient condition, especially when the behavior in question is inherently a social or collective action.

Another important social factor, a sense of belonging, had indirect links to BI and attitude via SN, altruism, generalized reciprocity, and knowledge self-efficacy. Because the English Wikipedia has so many members, it may be difficult to develop a sense of belonging because it is not easy to establish intimate connections or relationships with many Wikipedians. Even so, the study shows that this perception of community attachments/belongingness plays an important role in determining the extent to which Wikipedians share knowledge. More specifically, the findings show that SN, the perceived enjoyment of helping others (altruism), and moral obligations to reciprocate benefits (generalized reciprocity) become more salient to individuals when they have a strong sense of belonging. Commitment to a collective, such as knowledge contribution to Wikipedia, conveys a sense of responsibility to help others within the collective based on shared membership (Coleman, 1990; Wasko & Faraj, 2005). As such, individuals who have a strong sense of belonging are more inclined to believe that it is right (or that they ought to) to help others (altruism or SN) or to pay back benefits (reciprocity) by sharing their knowledge with other users. Similarly, individuals become more confident in their ability to contribute useful knowledge when they perceive others as members of the same community. As reviewed earlier, this sense of belonging can have a positive association with beliefs about knowledge self-efficacy because people may perceive that other members share the same interests, collective orientations, and community goals.

The results further show that the relationship between a sense of belonging and attitude was not significant. As shown in Figure 2, the relationship between a sense of belonging and attitude was mediated by altruism. Taken together, the findings highlight the utility of our research model. Previous studies have often explored the direct influence of social/normative factors (e.g., community attachments, membership, and a sense of belonging) on attitudes and behavioral intentions (Wasko & Faraj, 2001, 2005). In contrast, the current study’s findings indicate that social/normative factors (e.g., a sense of belonging) can have indirect links to attitude or BI via other related cognitive and social factors such as self-efficacy, altruism, SN, and generalized reciprocity. Hence, a more integrative approach as demonstrated in this research should be helpful for researchers in revealing the complex processes through which these social and cognitive processes are interlinked to reinforce one another. For instance, the multifaceted impact of a sense of belonging on knowledge-sharing intentions would not have been fully understood without adopting the integrated research model proposed and tested in this study.

In sum, the aforementioned findings demonstrate that the two social-relational and normative factors (a sense of belonging and generalized reciprocity) have significant associations with the central constructs of TPB. The findings also show that the nature of these relationships is somewhat complex to the extent that one variable (generalized reciprocity) has a direct link to BI, whereas the other (a sense of belonging) has an indirect link to BI via other cognitive and social factors. Hence, more holistic theoretical explorations are warranted for a better understanding of the complex mechanisms by which these social and normative factors are linked to knowledge-sharing intentions.

Limitations and Directions for Future Research

The current study has some limitations that also indicate directions for future research. First, we collected the data for the study by disseminating online surveys using membership registration lists. Although this was an easy and fast way to gather information, it may have led to self-selection bias. Because the samples in our study were more likely to be active members of Wikipedia, its findings may lack external validity to a certain extent. Given that it was impossible to obtain a comprehensive list of all Wikipedians, random sampling was not a viable option for this type of research. Future studies, however, may try to draw a more generalizable sample to enhance external validity. Related to this sampling issue, the study is based on a voluntary survey, which may lead to nonresponse bias. Of the 1020 members who were invited to take part in the survey, only about 22% (n = 223) actually gave responses. It can be argued that those who voluntarily took our survey might be the ones who were strongly committed to knowledge-sharing or prosocial behavior. Hence, the sample used in this study may overrepresent individuals who were altruistically motivated. Future studies could use more effective ways of increasing the response rate (e.g., offering incentives) to include both intrinsically and extrinsically motivated individuals in their samples.

Second, to make our integrative research model as parsimonious as possible, we focused on only a selected set of variables. For instance, we examined only two important motivation variables, altruism and reputation, to represent intrinsic and extrinsic motivation, respectively. As reviewed earlier, studies have shown that knowledge-sharing behavior can be induced by many other motivational factors, such as a sense of self-worth, learning, fun, and enjoyment (Bock et al., 2005; Kollok, 1999; Nov, 2007). Hence, future studies could incorporate those variables into their study design to gain a more comprehensive understanding of the motives behind knowledge sharing.
Third, an important limitation is that the study does not address actual knowledge contribution behaviors. Because this study is based on cross-sectional data, we were unable to test the path between intention and its corresponding future behavior. Many TPB studies have confirmed a strong association between BI and behavior (e.g., Azjen, 2002); several studies have also shown that BI is a good predictor of actual knowledge-sharing behavior (Lin, 2007; Ryu et al., 2003; So & Bolloju, 2005). However, future studies could employ a longitudinal study to include actual behavior in their research models to further extend the model proposed in this study.

Fourth, the study’s findings are based on correlational analyses, which makes it difficult to establish causality. This research employed an SEM technique to test its hypotheses and research model. Although SEM uses a causal modeling approach and has often been used to test causal relationships, this technique hardly provides proof of causation. We employed a correlational technique because the focus of this research is on developing an integrative theoretical model, which requires theoretical exploration of numerous direct and indirect relationships among variables. Nonetheless, we believe that experimental designs or longitudinal studies should be helpful for researchers to further test the causal relationships implied in this study. For instance, using an experimental design, researchers could manipulate extrinsic/intrinsic motivations (with different types of rewards) or a sense of belonging, and examine whether these conditions have a causal impact on knowledge-sharing intention or behavior.

Fifth, this study focuses on a specific knowledge-sharing context (i.e., Wikipedia), whose knowledge exchange rules, constraints, and social dynamics may differ from those of other knowledge-sharing environments. The integrated framework proposed in this study could be applied in other knowledge-sharing contexts to test the robustness of the research model proposed in this study.

Finally, a scale employed to measure generalized reciprocity in this study mainly focused on a normative aspect of reciprocity. Several studies have conceptualized generalized reciprocity as a type of extrinsic motivational factor by focusing on outcome expectations or on anticipation of reciprocal exchanges (Kim et al., 2007; Kollock, 1999). Although the scale employed in this study is consistent with standard measures of generalized reciprocity (Wasko & Faraj, 2005), future studies could include additional items to reflect both expectancy and normative accounts of generalized reciprocity in order to achieve a higher level of content validity. Related to this issue, the conceptual distinction between altruism and attitude is not completely clear. Conceptually, altruism specifically deals with the perceived enjoyment of helping others by sharing knowledge, whereas attitude refers to the perceived values and feelings associated with knowledge sharing in a more general sense. Empirically, CFA confirmed these constructs to be distinct factors. Nonetheless, both constructs measured the extent to which individuals had positive feelings as a result of knowledge sharing. Hence, future studies need to address this conceptual issue by developing more distinct scales that will clearly separate the two related factors.

Conclusion

In conclusion, this study has contributed to the existing research on knowledge sharing by proposing a research model that specifies theoretical intersections among key social, motivational, and belief factors pertaining to knowledge-sharing behavior in CMEs. The extension of the standard TPB formulation by integrating key motivational and social factors is theoretically worthwhile. We believe that the new research model proposed and tested in this study will enhance understanding of knowledge-sharing behaviors by (a) providing a more comprehensive perspective on exploring knowledge sharing and (b) suggesting a useful way of examining the underlying social and cognitive processes involved in collaborative knowledge building in virtual environments.

The study also demonstrates the unique characteristics of collaborative knowledge sharing in online contexts. For instance, we found that generalized reciprocity and a sense of belonging had direct and indirect associations with BI, whereas SN had a nonsignificant association with BI. The original TPB posits that SN is a primary form of social influence that assesses normative influences from ‘prominent’ others (e.g., coworkers or supervisors). SN plays a crucial function in affecting knowledge-sharing intention in densely connected social environments such as face-to-face groups or organizations because those influential others are often visible or socially proximal to a focal individual (Lin & Lee, 2004; So & Bolloju, 2005). However, knowledge sharing using CMC typically occurs in virtual, large-scale, and distributed social settings. Hence, more diffused and generalized forms of social dynamics (generalized reciprocity or a sense of belonging) can have stronger associations with BI.

The findings suggest that researchers should be cognizant of these unique contextual characteristics when they examine knowledge-sharing behavior in virtual environments. Finally, the study’s findings also have some useful practical implications. Given the popularity of Wikipedia and its significant epistemic impact (Fallis, 2008), understanding how and why individuals contribute knowledge to Wikipedia could help us develop recommendations for designing and implementing systems that facilitate collaborative knowledge-sharing behavior. Similarly, other online communities with user-generated content, such as video-sharing or knowledge-sharing communities, could gain useful insights from the findings on how to encourage contributions from participants.

The proposed research model and findings are also relevant to educational institutions and organizations that use wiki technology to encourage knowledge sharing. In particular, the findings suggest that creating or emphasizing Web site features that enhance feelings of altruism, reciprocity, a sense of belonging, and knowledge self-efficacy are very important to inducing the voluntary contribution of knowledge by users. For instance, e-mails could be sent out by
administrators to community members to assure them that their knowledge contribution would be valuable and useful, which would enhance their knowledge self-efficacy. Providing social spaces for community building (in addition to providing mere knowledge exchange) might also be useful to foster a sense of belonging and reciprocity obligations, which could result in higher levels of knowledge contribution.

The findings also have implications for some design aspects of Wikipedia. The sustainability of Wikipedia relies on the participation of people who are not necessarily validated experts on the subjects they write about. The study’s findings suggest that such people contribute when they think their contribution is valuable or significant. To promote continued contribution, Wikipedia could provide authors with information on how many times a page has been accessed or the number of hyperlinks created after their last contribution. This will give clear validation to contributors that their contribution is shared among many people and that it makes a meaningful difference. Another feature that might encourage generalized reciprocity or a sense of belonging among Wikipedians is a well-defined and defended group boundary. If a group or community is too diffused, free riding or social loafing become temptations. Hence, it is suggested that online interest groups be created for Wikipedians with common interests. Users within a group would be able to post questions, and other members would be encouraged to put up relevant information, as a heightened sense of belongingness and generalized reciprocity would lead to a greater intention to share knowledge. Features such as chat rooms and discussion forums organized around topics of interest would also generate new insights or questions pertaining to the topic. Greater interaction between members will lead to a strengthening of the sense of belongingness, which in turn will increase the degree of generalized reciprocity and the perceived enjoyment of knowledge sharing.

References


