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SHARING OF KNOWLEDGE IN PUBLIC KNOWLEDGE SPACES: INFLUENCING FACTORS

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Abstract

In recent years, knowledge sharing on the public domains such as Yahoo answers and Wikipedia has grown dramatically. These sites are allowing the general public to contribute knowledge and more and more web users are turning to each other for answers about everything. These websites have become an important resource for individual internet users. However, it is recognized that one of the critical factors determining a virtual community's success is its members' motivation to actively participate in community knowledge generation and sharing activities. The new wave of knowledge sharing on public knowledge spaces calls for research to identify what motivates people to share their very valuable knowledge on these sites when there is little possibility for monetary rewards. In an attempt to understand the factors that may influence this issue, this proposal explores related research. This paper contributes to the literature by investigating social exchange theory, public goods theory and organizational knowledge sharing under one umbrealla to develop a testable theoretical model for knowledge sharing in public knowledge spaces. The integration of these concepts into a unified theory of public knowledge sharing is an important step towards understating this phenomenon.

Keywords: Knowledge sharing, virtual communities, success factors for public knowledge spaces

Introduction

It is recognized that one of the critical factors determining a virtual community's success is its members' motivation to actively participate in community knowledge generation and sharing activities (Ardichvili et al. 2003; Wasko and Faraj 2000). In recent years, knowledge sharing on the public domains such as Yahoo answers and Wikipedia has grown dramatically. These sites are allowing the general public to contribute knowledge and more and more web users are turning to one another for answers about many different subjects (McAfee 2006). On some types of knowledge websites such as About.com or Ask Jeeves, information is posted by a select group of experts but can be searched by anyone. These websites have become an important resource for many individuals.

By the end of 2005, Wikipedia had more than 850,000 entries in English and over two million entries in other languages (McAfee 2006). This on-line encyclopedia was and still is being written and edited by reportedly 1.7 million registered users (Roush 2006). While some reports have noted the impressive increase in the knowledge contribution to these sites (McAfee 2006; Roush 2006) and how they are also relative accurate (Giles 2005; McAfee 2006), academic research has paid scant attention to this phenomenon.   Indeed, very little is known about what motivates people to share knowledge on these forums. In an attempt to understand the factors that may influence this issue, this proposal explores related research in social exchange theory, public goods theory and organizational knowledge sharing.

In virtual knowledge-sharing communities of practice individuals who are united in action for the larger collective community (Ardichvili et al. 2003). Communities of practice are not formal structures, rather they are informal entities, which exist in the minds of their members, and are glued together by the connections the members have with each other, and by their specific shared problems or areas of interest. Tacit knowledge gathered through the experience often resides in people's mind (Alavi and Leidner 1999). Not only new knowledge, but also skills are discursively produced and disseminated in conversations and networking activities. This leads us to postulate that one way to help people share and internalize tacit knowledge is to allow them to communicate about their experiences. The onslaught of the communities surrounding Wikipedia and Yahoo answers is a direct result of this need. Virtual communities of are among the few viable alternatives to allow live conversations and interactive knowledge exchange. The successful functioning of a knowledge-sharing community of practice is impossible without an active participation of a substantial number of its members (Ardichvili et al. 2003). A typical community in public knowledge spaces includes "facilitators", a number of "experts/contributors", and "subscribers. "Experts" actively participate in the community by posting knowledge entries, reviewing new postings, and answering questions posted to the community in general or to individual experts personally (Ardichvili et al. 2003) and is of main interest to this study.

This paper is organized as follows. With the help of subsections, in first part we discuss the relevant literature and theories in domain of knowledge sharing. Although, much of this research is done in organizational setting, we draw upon this literature in context of knowledge sharing in public domains. Next, we develop a testable theoretical model with a set of hypotheses with the goal of understanding why people contribute their expertise to public knowledge spaces. We end this paper by providing concluding remarks.

Theoretical Background

Theories considered in Knowledge Sharing Literature

Knowledge sharing research has considered three various ways in which information sharing is measured: intention to share, self-reported actual information sharing, observed actual information sharing and through sources. Subsequently different relevant antecedents have been considered by these studies and can be useful in providing insight into the problem in consideration. Similarly, these studies have used wide variety of theories in explaining knowledge sharing behavior. Following section overviews some of the theories in an attempt to develop a testable theoretical model.

Factors influencing Intention to Share

The *Theory of Reasoned Action* (TRA; (Fishbein and Ajzen 1975)) and the accompanying *Theory of Planned Behavior* (TPB;(Ajzen and Fishbein 1980)) have been widely used by researchers to explain behavior. The two theories are very similar with the exception that TPB includes the construct of Perceived Behavioral Control. In general, the Theory of Reasoned Action states that people behave the way they do because they intend to behave in that manner. Their intentions are based on their attitudes and subjective norms, which in turn are based on the individual's beliefs and the evaluations of these beliefs. Attitude in turn can be shaped by various factors and is discussed later in this section with the help of appropriate theories.

Subjective norms are based on normative beliefs and motivation to comply. Normally studies have considered the perception of the expectations of superiors or managers. For the scenario in consideration for this study, however, it may not be applicable as is and it may be appropriate to think more in terms of social descriptive norm. Recently, the IT literature has recognized wider role of social influence (Venkatesh et al. 2003). Social influence has an impact on individual behavior through three mechanisms: compliance, internalization, and identification (Venkatesh et al. 2003). Thus social norm can influence through various factors such as superior's influence, peer influence of behavior of others. A Descriptive norm is defined as the extent to which one believes others are performing the behavior, gets at the propensity an individual may have to indirectly reciprocate the believed behavior of others (Frey and Meier 2004).

Perceived behavioral control is belief about the presence of factors that may facilitate or impede performance of the behavior and the perceived power of these factors (control beliefs). This control can be a result of one's own abilities or other facilitations such as availability of resources (e.g, see (Taylor and Todd 1995)). Among the types of beliefs that individuals can derive from self-reflection in this context, none is more central than individuals' judgment his/her capabilities to deal effectively. (Bandura 1986) called this capability 'self efficacy'. Self efficacy is defined as "people's judgment of their abilities to organize or execute courses of actions required to attain designated types of performances. Such capability can be individual's expertise in the given subject. IS research has widely used self efficacy related to computing skills to study the IS usage. In KM context, Bassellier et. al. (2004) considered business competence as an antecedent of Intention in knowledge sharing. The knowledge and understanding IT professionals have of the business may be a key determinant in dealing with their business clients. This business competence provides them with the vocabulary and understanding needed to interact with business people.

Bock and Kim (2002) tested the Theory of Reasoned Action for knowledge sharing, and for the most part, the theory held true. However, the explained variance of actual knowledge sharing was very low ($r^2 = 0.014$), even though intentions to share were positively related to actual knowledge sharing ($p<0.05$). A possible reason for this weak finding (low explained variance) may be that the constructs need additional refinement. It is also possible that there is something about knowledge sharing that makes the Theory of Reasoned Action not applicable (Bock and Kim 2002). For example, there may be several moderating variables for Intention to Share Knowledge and Actual Knowledge Sharing such that these moderating variables weaken this relationship. For instance, a person may intend to share their knowledge, but due to resource limitations (e.g., no time or no ability to use technology), or communication channel limitations (e.g., limiting factors of computer-mediated communication channels) that people simply are not able to share what they had intended to share.

While (Bock and Kim 2002) found that information technology did not moderate the relationship between Intention to Share Knowledge and Actual Knowledge Sharing, they suggested that the lack of significant findings may have been due to the constrained operationalization of information technology. They considered actual use of the technology. They did not consider the limitations of the technology in terms of ease of use (*Technology Acceptance perspective*), or sufficient capability of technology for the task (*Task-Technology Fit perspective*). Research in technology acceptance has shown enormous effect of perceived ease of use on the use of technology by individuals (see (Legris et al. 2003) for review of select TAM studies). Knowledge flows in an on-line environment can not occur without the existence of transmission channel. Thus the existence and richness of transmission channels (Gupta and Govindarajan 2000) as well as appropriate technologies and interfaces to carry out the task is necessary.
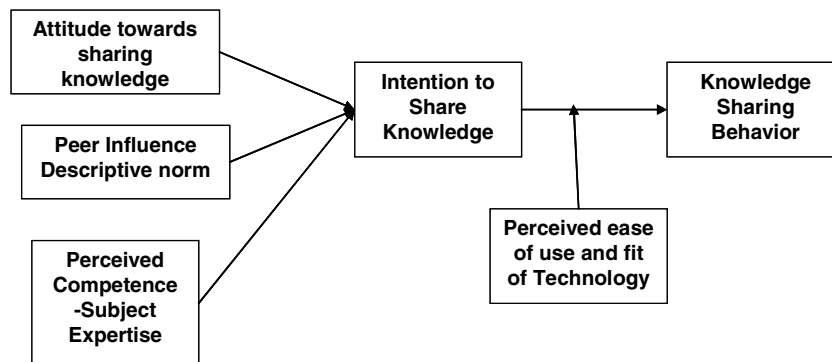

Figure 1: Factors Influencing Knowledge Sharing

Factors Influencing Attitude Towards Sharing Knowledge

In terms of what motivates people and molds their attitudes, researchers have considered *Economic Exchange Theory*. Economic Exchange Theory stipulates that if a person were to expect economic reward for a behavior, then s/he would enact that behavior. In a knowledge management perspective many have proposed incentives as a important dimension to influence user behavior to share knowledge (Ba et al. 2001; Rhee and Sanders 2006). In an intra-organizational information exchange

Barua, Ravindran and Whinston (1997) use the context of *Game Theory* and Social Exchange Theory and propose how and why the organizational culture, the appropriate reward systems and information technologies can assist in intra-organizational information exchange. The Effective use of intrinsic and extrinsic rewards has been researched in KM area. Although with the economic theories it seems obvious that extrinsic rewards will be beneficial to knowledge transfer, Bock and Kim (2002) found that the opposite occurred. Extrinsic rewards have been found less or not significant by many other studies (Kankanhalli et al.; Ko et al. 2005). They have found that intrinsic rewards were more significant in predicting knowledge sharing. Intrinsic motivation occurs when an activity "is valued for its own sake and appears to be self sustained" (Ko et al. 2005). These motivations can in the form of enjoyment of helping others (Kankanhalli et al.) and moral obligation to organization or society (Ardichvili et al. 2003; Wasko and Faraj 2000).

The economics literature, which examines consumer behavior in *public goods* situations, has relevance to knowledge sharing. Knowledge is often viewed as a public good. Ardichvili (2003) found that the majority of respondents view their knowledge as a public good, belonging not to them individually, but to the whole organization. This finding corresponds to what (Wasko and Faraj 2000) found in their study of online communities. When such perception exists, knowledge exchange is motivated by moral obligation and community interest, not by a narrow self-interest (Wasko and Faraj 2000). In the Ardichvili (2003) study participants pointed out two entities to which they feel this moral obligation: the organization as a whole, and their professional community of engineers (e.g. some have indicated that it is in the nature of engineering community to share knowledge, to work jointly on finding solutions for complex problems). A similar example can be found in the development of the open source systems such as Linux operating system. It has come about by programmers who contributed their code to the Linux project without directly expecting anything in return. The Ardichvili (2003) study found that several managers and experts felt that they had reached a stage in their lives when it was time to start giving back, sharing their expertise, mentoring new employees; and they felt that the participation in the community provided them with this opportunity. This phenomenon was also observed in alliances where public goods are voluntarily created by members who have a shared goal are based on gift economies which assume that members are non competing, have a common goal, and in which the resources being exchanged are characterized by abundance, rather than scarcity.

One theory that has held up well to knowledge sharing in this regard is *Social Exchange Theory* (Barua et al. 1997; Bock and Kim 2002; Constant et al. 1994; Wasko and Faraj 2000). Social Exchange Theory stipulates that social exchange tends to engender feelings of personal obligation, gratitude and trust (Bock & Kim, 2002). Furthermore, there is an implied direct reciprocity. For example, if a person were to do a favor for another individual, the recipient of that favor would be obligated to reciprocate in kind, or express gratitude. This reciprocity is enacted through the exchange of non-monetary/non-economic goods; therefore it is a social exchange rather than an economic exchange. Many of the above studies and discussion papers have used Social Exchange Theory to explain why people are motivated to share their knowledge. However, Wasko & Faraj (2000) note that it is often not a direct exchange between two individuals; rather, there is a generalized reciprocity. For example, in a community of practice a person may share their knowledge, but then expect "in kind" behavior from the community in general, not necessarily the recipient of his or her knowledge sharing. Social exchange theory also supports claim of the three factors at work in the knowledge market, specifically reciprocity, repute, and altruism. Davenport and Prusak (1998) state that altruism is a force in the knowledge market, where people are passionate about knowledge and want to share with no more than a "thanks" in return; however, "thanks" is a social good as it is gratitude.

Most studies that used public good and social exchange theories have been, at least partially, successful in investigating why people share their knowledge. The motivation to share knowledge could simply be one of goodwill. Social exchange theory posits that individuals wish for good outcomes not only for themselves but also for other employees and for the entire organization (Ardichvili et al. 2003). Indeed, they share knowledge because they feel a commitment to the organization, and believe that knowledge sharing will improve organizational efficiency, learning, innovation, and flexibility. Although economic and other theories may have potential and have been at least somewhat successful in investigating the monetary or other relevant incentives such as reputation, it is not within the scope of this investigation. This study focuses only on public domains to ascertain what motivates people to participate in the creation of public goods. In this regard, public good and social exchange is especially of importance. Knowledge does not deplete with sharing, and especially in sharing in public knowledge spaces does not have other --- such as ---. Success of open source software such as Linux give us insight into this phenomenon. Wikipedia which is "open content" project (referred to as open content in congruence with open source) is another example of such success. Many web 2.0 applications demonstrate this charactertistic.

Knowledge has also been considered from organizational ownership (Jarvenpaa and Staples 2001) and self-ownership (Constant et al. 1994; Wasko and Faraj 2000) perspectives to evaluate how these beliefs of ownership influence knowledge sharing. Organizational ownership has been studied with respect to sharing behaviors with mixed results. Constant et al. (1994) posited that if the individual believes that the organization owns his/her knowledge since it was created within the confines of the organization and sharing it with a colleague within the organization would benefit the organization, then s/he should share his/her knowledge (Constant et al., 1994). They found that oganizational ownership norms were positively associated with the intention to share knowledge. Jarvenpaa and Staples (2001), on the other hand, found that organizational ownership was negatively related to information sharing.

Researchers also have considered self-ownership which is similar to psychological ownership. *Psychological ownership* is based on the individual's beliefs about something belonging to the individual. The core of psychological ownership is the feeling of possessiveness and of being psychologically tied to an object. Constant et al. (1994) found that the higher the perception of self-ownership, the more willing the person was to share the expertise. Constant et al. (1994) proposed this was because the intrinsic benefits of knowledge sharing went to the "owner" of the expertise. Pierce et al. (1991) also supported the argument that the benefits of an asset were bestowed upon its owner. Pierce et al. (1991) and Pierce et al. (2003) proposed citizenship as one of the positive outcomes of psychological ownership. Citizenship is described as doing extra-role behavior such as going above and beyond that which is required to do one's job, and it is voluntary. Citizenship behaviors feed into self-identity; therefore, when an individual gets a sense of self from a social object, they perform behavior that enhance and protect that entity and hence their self-identity (Pierce, et al., 2003). If sharing one's knowledge with others enhances the self-identity associated with that knowledge, then psychological ownership would be related to an increase in knowledge sharing.(Wasko and Faraj 2000). People participated in communities of practice because they felt they owned their knowledge, and derived pleasure from sharing (a citizenship behavior). Constant et al. (1994) similarly found that the more one perceived one's expertise to be owned by oneself, the more likely they were to share that expertise.

Similarly, Pierce et al. (2003) argue that another outcome of psychological ownership is personal sacrifice and assumption of risk. Pierce et al. (2003) discuss personal sacrifice and assumption of risk in terms of protection of the self (by protecting the owned object, the person is protecting himself or herself). If by sharing one's knowledge, it protects the knowledge from becoming extinct or unrecognized by the organization, then psychological ownership would be positively related to intentions to share knowledge. However, researchers also have come across information hoarding situations. It is possible that employees do not wish to share their knowledge since, by doing so; they lose exclusive control over the knowledge (Gray 2001). Therefore, while it is likely that psychological ownership is positively associated with intentions to share knowledge (i.e., the more psychological ownership of the knowledge, the more likely one is to share), it is possible that some individuals will have the opposite relationship.

In general there have been mixed results in the ownership literature. This discrepancy may be due to the difference between the perceived ownership of the knowledge (self vs. organization or community) and perceived ownership of the organization or community itself. Therefore, this proposal contends to evaluate the psychological ownership of the knowledge space (the community or cause). From the above review it is visible that if individual believes in a commitment to a community or psychological ownership of the community, for the success of the community he/she is likely to have altruistic motivations. Also, as proposed by the psychological ownership literature, the outcomes of knowledge sharing in such scenarios may not bring about monetary gains but may be able to contribute to sense of stewardship or contribution to the society. Based on the literature in public goods, social exchange and psychological ownership we can evaluate the altruistic motivation such as moral obligation, perceived contribution and psychological ownership of knowledge space on knowledge sharing behavior.
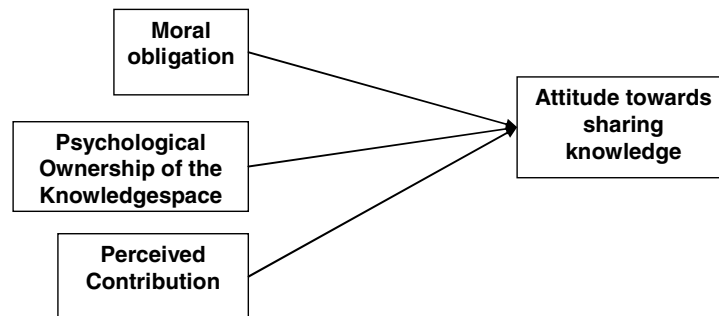
Figure 2: Factors Influencing Attitude

Other Factors influencing Knowledge Sharing Behavior

Social Cognitive Theory explains behavior in terms of the cognitive mechanisms and abilities of humans, specifically the way people think. Although, one facet of this theory was used in explaining perceive behavioral control or self efficacy that will allow positive attitude formation; we need to consider another dimension related to this theory. It is stipulated that due to the nature of how memories are formed and retrieved, individuals' abilities to be aware of all that they know are limited (Ford 2004). This limitation then influences their ability to articulate and replicate their knowledge. Swap et al. (2001) use cognitive theory to understand what conditions are necessary for effective learning to occur from the recipient's perspective.

This can also be seen from the perspective of *Communication Theory*. According to this theory, successful knowledge flows requires the ability and motivation to communicate from the informer's side, the communication channels, and the ability and motivation to receive the message from the recipient's side. Gupta and Govindarajan (2000) investigate how well Communication Theory explains knowledge flows within and between companies. Many other studies have evaluated or discussed components of this theory, i.e. the availability of rich communication medium, absorptive capacity of receiver and

articulation abilities of sender (Ko et al. 2005). In IT environments, professionals are expected to be able to put away their specialized vocabulary to communicate effectively with their partners (Reich and Benbasat 2000). Lee et al. (2003) include skills such as ability to communicate, manage projects, and work cooperatively in this category.

These abilities or available facilities can make impact on ability to share knowledge. Although, an individual may have intentions to share the knowledge but unavailability of these facilities (such as availability of rich and appropriate medium considered earlier in task technology fit dimension) as well as lack of articulation abilities may impede the process of knowledge sharing.
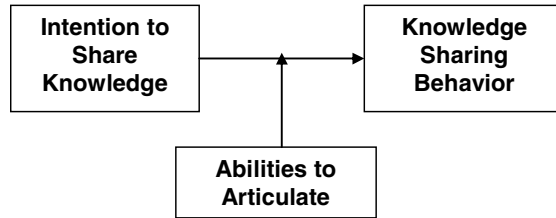

Figure 3: Other Factors Influencing Knowledge Sharing

Theoretical Development

As discussed in the theoretical background, several theories and antecedents have been considered with respect to knowledge sharing in organizational setting. This proposal integrates the Theory of Planned Behavior, Social Exchange Theory, Psychological ownership and Public goods theory to frame the model presented in Figure 4.
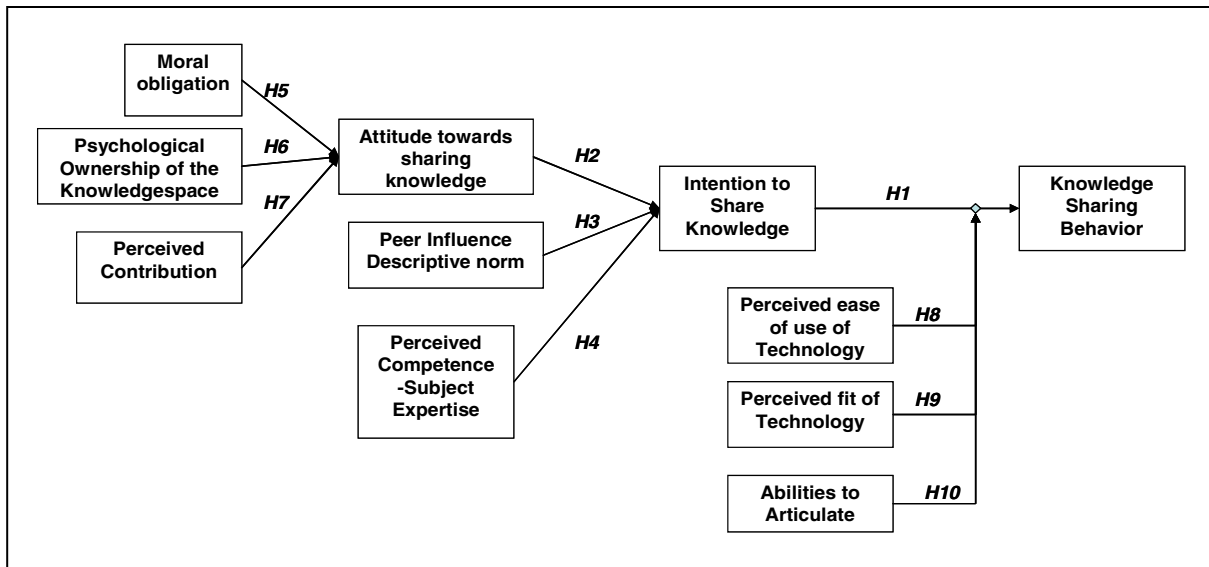

Figure 4: Model

Theory of reasoned action and Theory of planned behavior have been studied in wide range of environments. Both these theories include examination of relationship between attitude and intention, and the relationship between intention and behavior. These theories have been supported in many behavioral contexts including knowledge sharing. Bock (2002) found that as expected, positive attitude toward knowledge sharing leads to positive intention to share knowledge and finally to knowledge sharing behavior. Thus it can be proposed that

> *Hypothesis 1: The intention to share knowledge will be positively associated with knowledge sharing behavior.*
> *Hypothesis 2: The more favorable the attitude toward knowledge sharing is, the greater the intention to share knowledge will be.*

As discussed in earlier section the role of social influence can be complex and can have three mechanisms: compliance, internalization, and identification. In view of the third mechanism, i.e. identification, we can expect people to behave in a

way to reciprocate the believed behavior of other similar individuals. This notion is similar to descriptive norm considered in IS research. Thus we can expect that

Hypothesis 3: Higher peer influence will lead to higher intention to share knowledge.

Theory of planned behavior posits that perceived behavioral control impacts the attitude to carry out particular activity. Studies using self efficacy have argued that people's judgment of their abilities to organize or execute courses of actions required attaining designated types of performances. Based on this percept, we can expect that individual's judgment about his/her expertise/capabilities is going to be a major factor influencing knowledge sharing attitude. Knowledge sharing study by Bassellier (2004) argues that expert knowledge about the related processes necessary and found that business competence was a necessary component of partnership relationship. He argued that such business competence provides them with the vocabulary and understanding needed to interact with business people. Thus we can expect that if an individual has an expertise in a particular area, he/she is likely to be able to share to these on-line domains and is like to have positive attitude to share. Thus we can expect

Hypothesis 4: Higher competence (subject expertise) will lead to higher intention to share knowledge.

Much of knowledge sharing research has found the evidence that people share knowledge for altruistic reasons. They believe that knowledge belongs to everyone and sharing the knowledge will not lead to scarcity. On the other hand, sharing the knowledge will lead to abundance. It is necessary to share knowledge for the betterment of community/society and it will also lead the knowledge not to become extinct.

If an individual has psychological ownership of the community, he/she is likely to have sense of citizenship, stewardship and responsibility towards it. For the success of the community he/she is likely to have motivations to share knowledge to sustain the longitude of the knowledge. Thus we can expect,

Hypothesis 5: Higher perception of moral obligation will lead to more positive attitude to share knowledge.
Hypothesis 6: Higher level of psychological ownership of the knowledge space will lead to more positive attitude to share knowledge.

Bock (2002) studied the expected contribution in organizational setting referring to idea of employees' belief that they can make contribution to the organization's performance and its effect on attitude. They found a positive relationship. As discussed in psychological ownership and public goods literature, although the rewards may not be monetary, the sense of contributing may enhance one's perception through self-identity. Hence we can propose.

Hypothesis 7: Perception of contribution will have positive effect on the attitude towards knowledge sharing.

Knowledge sharing in on-line communities needs using technologies. Although many of these technologies and interfaces are relatively easy to use, many features of the interface can be confusing or challenging. Technology acceptance research has clearly established the role of perceived ease of use of technology. As argued in the literature, we can expect that if the technology is not easy to use, it is likely to discourage or impede use of these technologies. In the context of this proposal, even if a person may be inclined to share the knowledge, if he/she is not acquainted with the technology, he/she is may not be able to carry out the activity. On the other hand if the person is conversant with the technology, he/she is more likely to be able to carry out the activity of knowledge sharing. Similarly, if the technology does not offer enough features to carry out the activity it will be impeding. Benbya et al. (2004) caution that technology factors such as poor usability and poor design can lead to failures of such implementations. Thus we can hypothesize

Hypothesis 8: Perceived ease in using technology will positively affect the relationship between intention to share knowledge and actual knowledge sharing.
Hypothesis 9: Perceived fit of technology for the given task of sharing knowledge will positively affect the relationship between intention to share knowledge and actual knowledge sharing.

Ability to communicate and articulate has perceived some attention in knowledge sharing literature. Although expertise in subject area is important to be cognoscente with the vocabulary, many have recognized the importance of to be able to put away specialized vocabulary to communicate effectively with other (Bassellier and Benbassat 2004; Reich and Benbasat 2000). Thus we can expect

Hypothesis 10: Ability to articulate will positively affect the relationship between intention to share knowledge and actual knowledge sharing.

Conclusion

The new wave of knowledge sharing on public knowledge spaces calls for research to identify what motivates people to share their very valuable knowledge on these sites when there is little possibility for monetary rewards. Although, there has been some research in knowledge sharing in organizations, the research on public knowledge spaces is very sparse . In this regard this paper has several theoretical and practical implications. This proposal will bridge this gap by developing a research framework for understanding the factors that influence knowledge sharing via several well-developed theories including the Theory of Planned Behavior, Social Exchange Theory, Psychological ownership and Public goods theory. The integration of these concepts into a unified theory of public knowledge sharing will be an important step towards understating this phenomenon. The empirically validated model can lead to practical implications for enhancing knowledge sharing to make these knowledge spaces richer.

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