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Exploring Behavioral Transfer from Knowledge Seeking to Knowledge Contributing: The Mediating Role of Intrinsic Motivation

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Knowledge contributing has long been identified as a bottleneck in knowledge management since individuals tend to believe that their contributing would not be worth the effort, given high levels of expectation to receive some value in return. Self-perception theory posits that individuals come to 'know' their own internal beliefs by inferring them partially from observations of their own overt behavior. Building on self-perception theory and adhering to the principle that the relationship between behavior and beliefs is one of mutual influence, we develop a research model to explore the behavioral transfer from knowledge seeking to knowledge contributing and consider the mediating effect of intrinsic motivation. Data collected from 430 users of Web 2.0 applications were used to test the model. The mediating role of intrinsic motivation between knowledge seeking and contributing is confirmed. These findings and their implications for theory and practice are discussed.

Introduction

Knowledge is a critical resource for organizations and has long been a focus of research (He & Wei, 2009). Organizational knowledge includes a variety of unique and inimitable components, including "intangible assets, operational routines and creative processes" (Wasko & Faraj, 2005, p.36). However, it is unlikely that the knowledge residing in human minds can be transferred to or shared with others through a simple copying process. Instead, a unique set of mental rules and behavioral patterns are needed that balance personalized and institutionalized perspectives of knowledge which may include "facts, procedures, concepts, interpretations, ideas, observations, and judgments" (Alavi & Leidner, 2001, p.109). Given these intellectual imperatives, simply making a knowledge repository available cannot guarantee success (Watson & Hewett, 2006). It was estimated that "at least US$31.5 billion are lost per year by Fortune 500 companies as a result of failing to share knowledge" (Wang & Noe, 2010, p.115), even though corporations continue to plough significant amounts of energy and investment into the development of knowledge management systems (KMS) which "facilitate the collection, storage, and distribution of knowledge" (ibid.).

The term Web 2.0 emerged in 2004 (coined by Dale Dougherty and popularized by O'Reilly Media and MediaLive International) (Madden & Fox, 2006). Since then, Web 2.0 has provided "a

useful, if imperfect, conceptual umbrella under which analysts, marketers and other stakeholders in the tech field could huddle the new generation of internet applications and businesses that were emerging to form the 'participatory Web' as we know it today" (Madden & Fox, 2006, p.1). Web 2.0 has become a popular term in the Internet world and occasionally even in the public media (Chu & Xu, 2009). Web 2.0 applications such as weblogs, microblogs and wikis and the virtual communities formed by these technologies, exert extensive and important influences on human society. Since the basic premise of Web 2.0 is that people are encouraged to participate in the shared creation of content, with knowledge seeking and contributing being major activities, so it can be regarded as an efficient knowledge management tool (Yu, Lu, & Liu, 2010). As important instances of the application of Web 2.0 technologies, virtual communities refer to "online social networks in which people with common interests, goals, or practices interact to share information and knowledge, and engage in social interactions" (Chiu, Hsu, & Wang, 2006, p.1873). In this respect, knowledge exchange in a virtual community exhibits significant differences from more traditional communities of practice or contexts where knowledge is exchanged between people who know each other on a continuous basis (Wasko & Faraj, 2005). In a virtual community, it is particularly noticeable that there are few explicit reward structures to support knowledge exchange in the absence of "mutual trust, interaction, and reciprocity among individuals" (Chiu et al., 2006, p.1876). In this study, we focus on the Web 2.0 applications of virtual communities in China, where there are many popular virtual communities such as Baidu Know, Baidu Post Bar, Renren Network and Sina Microblog each of which attracts millions of users.

Knowledge contributing and knowledge seeking demonstrate two distinct types of behavior, yet each is closely related to the other and both must occur for the presumed benefits of knowledge management to be realized (He & Wei, 2009). Given the context of Web 2.0 virtual communities where users typically don't know one another or don't necessarily expect to meet face-to-face, we suggest that intrinsic motivating factors to engage in knowledge exchange are more likely to be salient. Intrinsic motivation is reported to be the key determinant of knowledge contributing in organizational contexts (Kankanhalli, Tan, & Wei, 2005). However, how employees actually attain a high level of intrinsic motivation is little researched and the causal chain of knowledge sharing activities regularly stops at this point. It is not reasonable to expect that each employee would naturally have a high level of intrinsic motivation in both organizational and virtual contexts, which may explain why knowledge contributing is a bottleneck. Consequently, leaving the findings at this point is unlikely to convey sufficient information for organizations which need to take specific measures to cope with this bottleneck. We thus believe it is critical to trace back further along the causal chain of knowledge sharing activity to explore the precursor(s) of intrinsic motivation.

Self-perception theory suggests that individuals understand their own internal beliefs through a process of inferring them from observations of their own overt behavior (Bem, 1972). In this study, we first consider knowledge seeking behavior given the nature that users of a Web 2.0 virtual community are most likely to use it initially in order to seek knowledge from rather than contribute knowledge to the community. We suggest knowledge seeking behavior can play the role of a precursor to intrinsic motivation of knowledge contributing: the reason why users seek knowledge is simply that other users are contributing. Further, we introduce intrinsic motivation, including enjoyment in helping others, sense of self-worth and the concept of flow which is conceptualized as the most enjoyable and optimal experiences (Csikszentmihalyi & LeFevre,

1989), all of which lead to knowledge contributing. We believe it is critical to explore the transfer of employee behavior from knowledge seeking to knowledge contributing and the mediating effect of intrinsic motivation, for knowledge sharing research and practice alike.

Following this introduction, we review the theoretical background, paying particular attention to self-perception theory and intrinsic motivation, before developing our research model and hypotheses. We follow this with a description of the research methodology, the results of the research and a discussion of these results before concluding the paper.

Theoretical Background and Research Model

Self-Perception Theory

The core of self-perception theory lies in the fact that "individuals come to 'know' their own attitudes and other internal states partially by inferring them from observations of their own overt behavior and the circumstances in which it occurs" (Bem & McConnell, 1970, p.23). For example, a person may respond to a question about beliefs and attitudes toward enjoyment in helping others by saying, "I often use Web 2.0 applications to seek knowledge, so I believe that others enjoy helping me when I seek knowledge. Reciprocally, I enjoy helping others". This inference process is the same as the form of interpersonal perception, where outside observers (A) would infer B's internal state from B's behavior. Consequently, "an individual's observation of his own behavior has been shown to be the partial basis for his recall of previous events … as well as for his beliefs and attitudes" (Bem & McConnell, 1970, p.23).

Based on self-perception theory, Melone (1990, p.87) suggested that the attitude of an IS (information system) user can be represented as a multi-attribute belief structure and "attitude change takes place in reaction to self-observed behaviors combined with observation of external cues which indicate if the behavior is likely to be valid or truthful". Melone (1990) further argued that there is a bias among IS researchers who focus on the link from beliefs to behavior, but fail to consider that attitudes can result from behavior, not cause behavior. In fact, the relationship between behavior and beliefs is one of mutual influence (Melone, 1990; Song, Zhang, Chen, & Huang, 2009).

Intrinsic Motivation

Motivation has been defined as a "process that energizes and governs individuals in choosing a voluntary behavior among various alternatives, and sustains the choosing behavior" (Yang & Lai, 2011, p.132). Intrinsic and extrinsic motivations are two widely accepted motivational sources in many related studies and there is evidence to demonstrate that motivation can be used to predict both an individual's intention to perform a behavior, and the actual behavior. For example, Oh (2012) explored such motivations as self-enjoyment, self-efficacy, altruism and social engagement for sharing information, knowledge and experiences in online environments. Bock, Zmud, Kim and Lee (2005) used anticipated extrinsic rewards and sense of self-worth as motivational variables to predict knowledge sharing intention. Wasko and Faraj (2005) used reputation and enjoy helping others as motivational variables to explore an individual's knowledge contributing in virtual community. Kankanhalli et al. (2005) considered such extrinsic motivational factors as organizational reward, organizational reward identification, image, reciprocity as well as such

intrinsic motivational factors as knowledge self-efficacy and enjoyment in helping others in their model to predict the usage of electronic knowledge repositories to contribute knowledge.

Intrinsic motivation involves performing an activity and engaging in it for the sake of the activity itself rather than for external rewards (Baer, Oldham, & Cummings, 2003; Wasko & Faraj, 2005). The benefits of intrinsic motivation are in part derived from the concept of altruism. As Kankanhalli et al. (2005, p.122) note, "altruism exists when people derive intrinsic enjoyment from helping others without expecting anything in return". Sense of self-worth is another excellent example of intrinsic motivation, defined by Bock et al. (2005, p.107) as "the degree of one's positive cognition based on one's feeling of personal contribution to the organization".

Moreover, flow is an experience of the activity as intrinsically rewarding, under which, "individuals tend to be curious, cognitively flexible, willing to take risks, and persistent in the face of barriers" (Baer et al., 2003, p.571). Flow is defined as a holistic sensation that people feel when they act with total involvement (Csikszentmihalyi, 1975), an optimal experience, the best feelings, the most enjoyable experiences possible in human lives that stem from people's perceptions of challenges and skills in given situations (Csikszentmihalyi, 1975; Csikszentmihalyi & LeFevre, 1989). Flow is characterized by a match between perceived challenges and perceived skills (Csikszentmihalyi, 1975). When an individual is in a state of flow, he or she operates "at full capacity" and is in a state of "dynamic equilibrium" between skills and challenges (Nakamura & Csikszentmihalyi, 2002, p.90). However, flow itself is not constant. The extent to which an individual experiences a state of flow depends on the individual's skills in meeting challenges. If the level of challenge exceeds the available skills, then the individual may become "vigilant and then anxious". On the other hand, if the challenges are insufficient given the skills available, then there is a risk that the individual "first relaxes and then becomes bored" (ibid.). Therefore, "over time, the same activity may make a person feel anxious one moment, bored the next, and in a state of flow immediately afterward" (Chen, Wigand, & Nilan, 1999, p.588).

Research that uses flow as a theoretical foundation crosses many fields, including both work and play. Some researchers have focused on situations such as playing where there are salient intrinsic rewards. Other researchers have examined work contexts such as surgery "where the extrinsic rewards of money and prestige could by themselves justify participation" (Nakamura & Csikszentmihalyi, 2002, p.89). A picture of the general characteristics of optimal experience and its proximal conditions has been formed, with the reported experiences being "remarkably similar across play and work settings" (ibid.).

It was reported that a tiered membership works as an incentive for participation in many Chinese online virtual communities, which means members achieve a higher status by contributing, thus obtaining more trust from other members (Liao, Pan, Zhou, & Ma, 2010). This kind of tiered membership can function as a form of extrinsic reward. However, we suggest that, just like a work context, such as surgery mentioned above, in the course of knowledge sharing in a virtual community, it is intrinsic motivation that adopts a salient and facilitating role which motivates participation in knowledge sharing activities.

Research Model and Hypotheses

If a virtual community lacked rich knowledge, then it would be of limited value, which implies that "the significance of member-generated content (knowledge) cannot be over-emphasized" (Chiu et al., 2006, p.1873). Based on self-perception theory and adhering to the principle that the

relationship between behavior and beliefs is one of mutual influence (Melone, 1990; Song et al., 2009), we develop our research model to explore how knowledge contributing is impacted by intrinsic motivation which is further impacted by knowledge seeking. Web 2.0 Usage for Knowledge Seeking (Contributing) in this study refers to the actual usage of Web 2.0 for knowledge seeking or knowledge contributing with respect to the frequency of use and the amount of time involved (Venkatesh, Morris, Davis, & Davis, 2003; Kankanhalli et al., 2005).

As an elusive yet broad concept, there are different viewpoints on the components of flow (Hoffman & Novak, 2009). Koufaris (2002) used the three dimensions of perceived enjoyment, perceived control and attention focus in his research on flow in online consumer behavior. Guo and Klein (2009) suggested that flow includes six constructs: concentration, perceived control, merging of activity and awareness, transformation of time, transcendence of self, and autotelic experience. Meanwhile, Lu, Zhou and Wang (2009) conceptualize flow in just two factors: perceived enjoyment and concentration. Among the components of flow, perceived enjoyment and attention focus are two of the most-often encountered (Finneran & Zhang, 2005; Hoffman & Novak, 2009; Zaman, Anandarajan, & Dai, 2010; Zhou & Lu, 2011). Following the work by Novak, Hoffman and Yung (2000), we treat flow in this study as a second-order construct reflected by perceived enjoyment, which is defined as the extent to which the activity of using the Web 2.0 application is perceived to be enjoyable in its own right apart from any performance consequences (Chin, Marcolin, & Newsted, 2003); and attention focus, which is defined as the extent to which an individual is able to focus on the Web 2.0 application only when using it (Lu, Zhou, & Wang, 2009). The complete research model is presented in Figure 1.

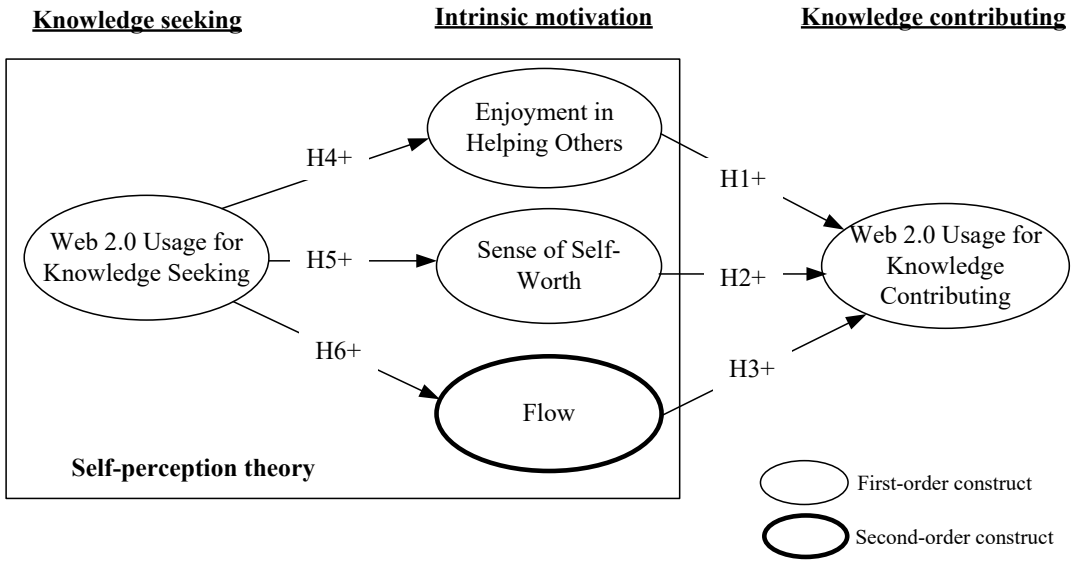

FIG. 1. Research model.

Enjoyment in helping others is "defined as the perception of pleasure obtained from helping others through knowledge contributing" (He & Wei, 2009, p.828) and is reported to be the key determinant of knowledge contributing in the organizational context (Kankanhalli et al., 2005). In the context of virtual communities, individuals are most likely to contribute knowledge because "they perceive that helping others with challenging problems is interesting, and because it feels

good to help other people" (Wasko & Faraj, 2005, p.40). Consequently, being excited about knowledge contributing and engaged in it for the sake of the knowledge contributing behavior itself, "individuals are motivated intrinsically to contribute knowledge to others because engaging in intellectual pursuits and solving problems is challenging or fun, and because they enjoy helping others" (ibid.). Thus, we hypothesize:

H1: Enjoyment in Helping Others is positively related to Knowledge Contributing.

Sense of self-worth in this study is defined as the degree of one's positive cognition based on one's feeling of personal contribution to the Web 2.0 virtual community through knowledge contributing (Bock et al., 2005). The formation of self-concept, as a kind of intrinsic reward, is taken from many different processes, including self-worth (Shamir, House & Arthur, 1993). A general sense of self-worth increases general self-efficacy which is a source of strength and confidence (ibid.) and effective performance. Therefore, a user who is able to sense the linkage between his/her knowledge contributing behavior and the improvement in work of other users, would be more likely to contribute knowledge (Huang, Davison, & Gu, 2008). Thus, we hypothesize:

H2: Sense of Self-Worth is positively related to Knowledge Contributing.

Flow is an optimal experience and works as a salient intrinsic motivation. Intrinsically motivated individuals with flow "tend to experience positive mood states, such as excitement and enthusiasm" and tend to take exploratory behavior such as risks (Baer et al., 2003, p.571). Knowledge contributing is a kind of exploratory behavior which brings users many challenges. For example, users reported challenges when engaging in debate: "Engaging in a 'conversation' via a newsgroup challenged my ideas or way of thinking" (Chen, Wigand, & Nilan, 2000, p.277). Challenges emerge when "offering help through answering questions where someone asked for assistance from me or when a question was posed that needed research" (ibid.). Furthermore, previous studies have identified numerous positive consequences of flow, "including increased exploratory behavior" (Novak, Hoffman, & Yung, 2000, p.30). We thus hypothesize:

H3: Flow is positively related to Knowledge Contributing.

Intrinsic motivation plays a role in predicting knowledge contributing, yet how employees can attain a high level of intrinsic motivation has been the subject of little attention in previous studies; the causal chain of knowledge sharing activities regularly stops at this point. We thus believe it is critical to trace back further along the causal chain of knowledge sharing activities to explore the precursor of intrinsic motivation to contribute knowledge. We suggest that knowledge seeking behavior can play a role as the precursor of intrinsic motivation considering that the reason why users choose to seek knowledge may simply be that other users are already contributing knowledge.

When a person thinks that others are likely to receive pleasure from helping him/her through knowledge contributing, this person would feel free to frequently seek knowledge from this Web 2.0 virtual community. Based on self-perception theory, this person can come to "know" his/her own internal beliefs partially by inferring them from observations of his/her own overt knowledge seeking behavior and reflecting that: "I believe that others enjoy helping me through contributing their knowledge". We suggest that the belief "others enjoy helping me" is most likely to lead to

the belief "I enjoy helping others". Thus, we hypothesize:

H4: Knowledge Seeking is positively related to Enjoyment in Helping Others.

Similarly, when a person perceives that others hold a higher sense of self-worth of positive cognition based on their feeling of personal contribution to the Web 2.0 virtual community, this person would feel free to frequently seek knowledge from this Web 2.0 virtual community. Based on self-perception theory, this person can come to "know" his/her own internal beliefs partially by inferring them from observations of his/her own overt knowledge seeking behavior: "I believe that others have a higher sense of self-worth". We suggest that the belief "others have a higher sense of self-worth" is most likely to lead to the belief "I should also have a higher sense of self -worth". Thus, we hypothesize:

H5: Knowledge Seeking is positively related to Sense of Self-Worth.

The Web is reported to be a platform that can easily help people to enter the state of flow. Hoffman and Novak (1996, p.57) define the flow experience in a computer-mediated environment as "the state occurring during network navigation, which is characterized by a seamless sequence of responses facilitated by machine interactivity; intrinsically enjoyable; accompanied by a loss of self-consciousness; and self-reinforcing". Chen, Wigand and Nilan (1999) used three quotations devised by Csikszentmihalyi (1975) to directly elicit 304 Web users' perceived flow experiences on the Web. In a separate study, they suggest that "using the World Wide Web is an activity that facilitates flow, which generates an optimal, extremely enjoyable experience with total involvement and concentration" (Chen, Wigand, & Nilan, 2000, p.263).

As for seeking knowledge from the Web, a considerable body of evidence supports the idea that it leads users to experience flow. It is indicated that "the most frequently reported activity which brought them into the flow state was information searching on the Web" (Chen et al., 2000, p.268) and "whether it is reading newsgroups or doing a search for a particular thing I tend to concentrate and lose myself" (Chen et al., 2000, p.272). Moreover, based on self-perception theory, individuals can come to "know" their own internal flow state partially by inferring them from observations of their own overt knowledge seeking behavior. Thus, we hypothesize:

H6: Knowledge Seeking is positively related to Flow.

Method and Data Collection

Measures Development

All the constructs and the corresponding measurement items are adapted from the previous literature to fit the context of this study. Specifically, the items measuring Web 2.0 Usage for Knowledge Seeking and Web 2.0 Usage for Knowledge Contributing were adapted from Kankanhalli et al. (2005) and Venkatesh et al. (2003); the items measuring Perceived Enjoyment and Attention Focus were adapted from Koufaris (2002); the items measuring Enjoyment in Helping Others were adapted from Kankanhalli et al. (2005); the items measuring Sense of Self-Worth were adapted from Bock et al. (2005). The complete instrument can be found in Appendix A. All the items were measured with a 7-point disagree-agree Likert scale.

Data Collection

The research methodology and data collection process consisted of three stages, viz.: belief elicitation, a pilot survey and a large scale survey. In order to elicit employees' current beliefs towards knowledge seeking and knowledge contributing in the context of Web 2.0, we first undertook a qualitative investigation. In this process, we first registered as users in two well known Web 2.0 applications (Baidu Know and Tianji Network) and covertly conducted a series of structured observations. We identified and observed some active users and recorded: the content such as date, name or pseudonym and other basic information of these users; the content category in which these users contributed; and the frequency with which these users contributed. This observation process lasted for 20 days and resulted in 176 records. Next, in addition to the behavioral observation above, in order to capture more insights concerning knowledge seeking and knowledge contributing behaviors and beliefs by users in the context of Web 2.0, we conducted qualitative interviews with 11 current Web 2.0 users who were willing to participate. The interview protocol can be found in Appendix B.

Based on the qualitative investigation, we modified our theoretical model and then developed a survey instrument. We collected pilot data from current Web 2.0 users in China (40 usable questionnaires). We also had the opportunity to interact with some of these respondents when they experienced problems completing the survey. Based on feedback received from the pilot survey, we adjusted wordings in several items. We then conducted a large scale survey.

The main study targeted employees in organizations who are also participants in Web 2.0 virtual communities. Drawing on alumni from two Chinese universities, we attempted to locate organizations that would be willing to participate in the research. We contacted organizations through email and telephone and invited them to participate in the survey. Some could not be contacted successfully, while others indicated that they do not participate in this kind of research. Finally we obtained consent to participate from 14 organizations. In each of these organizations, employees were randomly invited to participate in the survey. Data collection was undertaken on a voluntary basis through printed paper questionnaires or an online survey website according to respondents' preferences. This process lasted for 6 weeks. The response rate in these 14 organizations varied but the average response rate across different organizations was approximately 60%. We received 232 valid questionnaires in printed form and 198 valid questionnaires were completed online. The t-test of the demographic characteristics of the participants who responded on printed forms did not significantly differ from those who responded online. We thus pool them together for data analysis. Table 1 documents the demographic information of these 430 respondents.

TABLE 1. Demographic information of survey respondents.

Measure	Items	Frequency	Percent
Gender	Male	213	49.5
	Female	217	50.5
Age	< 20	0	0
	20-30	287	66.7
	31-40	105	24.4
	41-50	30	7.0

	>50	8	2.0
Education	Secondary school or less	4	1.0
	Post-secondary study	41	9.5
	Bachelor level	228	53.0
	Master level or higher	157	36.5
Organization size (# of employees)	< 100	115	26.7
	100-1000	116	27.0
	1001-2000	69	16.0
	> 2000	130	30.2
Ownership nature	State Owned	241	56.1
	Privately Owned	110	25.6
	Joint Venture	35	8.1
	Foreign Owned	44	10.2
Current position	Junior	213	49.5
	Middle	165	38.4
	Senior	52	12.1
Overall work experience (number of years)	<5	224	52.1
	5-10	111	25.8
	11-20	64	14.9
	>20	31	7.2

We believe that these 430 respondents constitute a reasonably representative sample of employees in organizations. In the survey questionnaire, we first described Web 2.0 and listed the main popular Web 2.0 applications of virtual communities in China, such as Baidu Know, Renren Network, Baidu Post Bar, Baidu Experience, Sina Microblog, QQ Microblog, Wikipedia and Baidu Document. These Web 2.0 applications each have their own unique features and operating mechanisms. For example, users of Baidu Know can ask any question which other users may be able to answer. According to the answers received, the user who asked a question can first compare all the answers according to his\her judgment and second flag the best answer. All these process are recorded by the Baidu Know system. Other users can easily search all these questions and locate the satisfactory answers. Given that each Web 2.0 application has different features, especially in terms of interface design, the basic premise of these Web 2.0 applications is that people are encouraged to participate in the shared creation of content, with knowledge seeking and contributing being the major activities. Thus, "Web 2.0 is of the user, by the user, and more importantly, for the user" (Chu & Xu, 2009, p.717). Given that all Web 2.0 applications share the same basic premise, it is reasonable to collect data from any of them.

During our visits to these Web 2.0 sites, as well as our structured observations on Baidu Know and Tianji Network, we saw hundreds of types of knowledge seeking and contributing activities occurring. Typical topics included: technological know-how; knowledge about sales and marketing; knowledge about financial resources; knowledge about management. For example, what kinds of network marketing strategy are there? Which software is better for customer management? How to make the transaction process in CRM (Customer Relationship Management) more scientific? How to implement knowledge management in real estate enterprises? How to show if an organization has initiated knowledge management practices?

Due to the ubiquity of Web 2.0 virtual communities and following Zhou (2011) who collected data from subjects based on their favorite online community usage experience, we similarly indicated in the survey instrument that the respondent should respond according to the one Web 2.0 virtual community he/she uses most frequently. All data was collected in Chinese and translated into English for this paper.

Data Analysis and Results

We employed SmartPLS (Ringle, Wende, & Will, 2005) to verify our measurement and theoretical model, since the PLS (Partial Least Squares) algorithm is a components-based structural equation modeling technique that has gained acceptance among IS researchers (He & Wei, 2009; Liang, Saraf, Hu, & Xue, 2007). PLS uses an iterative algorithm which consists of a series of ordinary least squares analyses, having the ability to model latent constructs under conditions of non-normality and with smaller sample sizes and can handle formative constructs (Chin, Marcolin, & Newsted, 2003). As an alternative to the more widely known covariance fitting approach (exemplified by software such as LISREL, EQS and AMOS), the component-based PLS is better suited for explaining complex relationships as it avoids two serious problems: inadmissible solutions and factor indeterminacy (Fornell and Bookstein 1982). Being a components-based structural equation modeling technique, PLS "is similar to regression, but simultaneously models the structural paths (i.e., theoretical relationships among latent variables) and measurement paths (i.e., relationships between a latent variable and its indicators), … allowing each indicator to vary in how much it contributes to the composite score of the latent variable", thus being "preferable to other techniques" (Chin et al., 2003, p.197).

Measurement Model Validation

Before testing the hypothesized relationships, we first assessed measurement validity, including content validity, convergent validity and discriminant validity. With regard to content validity, since all constructs and items are based on the previous literature, subject to minor improvements in wordings after the pilot survey, we thus believe each of them is accurately expressed and has a clear meaning.

The whole measurement model consists of 6 first-order reflective constructs. After running the model, we obtained results that support the convergent validity and discriminant validity. Factorial validity such as item loadings and cross loadings can also be used to help assess convergent validity and discriminant validity (Straub, Boudreau, & Gefen, 2004).

Table 2 shows the Average Variance Extracted (AVE), Composite Reliability (CR) and Cronbach's Alpha of each construct. We can see that all the values of CR are greater than 0.921 and all the values of Cronbach's Alpha are greater than 0.871 which suggests a high degree of reliability and convergent validity of all the reflective constructs (Straub et al., 2004).

TABLE 2. Overview of measurement model.

Constructs	Items	AVE	CR	Cronbach's Alpha
Attention Focus (ATTF)	4	0.814	0.946	0.924

Enjoyment in Helping Others (ENJHO)	4	0.843	0.956	0.938
Perceived Enjoyment (PEREN)	4	0.813	0.946	0.923
Sense of Self-Worth (SENSW)	5	0.849	0.966	0.956
Web 2.0 Usage for Knowledge Contributing (USAKC)	3	0.909	0.968	0.950
Web 2.0 Usage for Knowledge Seeking (USAKS)	3	0.796	0.921	0.871

The left section of Table 3 shows the Mean and Standard Deviation (SD) of each construct. The right section shows the correlations between constructs and square roots of AVE. We can see that the square root of each construct's AVE is larger than its correlations with other constructs, suggesting sufficient discriminant validity (Straub et al., 2004).

TABLE 3. Descriptive statistics, correlations between constructs and square roots of AVE.

	Mean	SD	ATTF	ENJHO	PEREN	SENSW	USAKC	USAKS
ATTF	4.12	1.44	**0.902**					
ENJHO	4.60	1.41	0.486	**0.918**				
PEREN	4.72	1.36	0.723	0.510	**0.902**			
SENSW	4.60	1.32	0.475	0.727	0.498	**0.921**		
USAKC	3.36	1.65	0.490	0.476	0.361	0.393	**0.953**	
USAKS	4.87	1.49	0.487	0.434	0.540	0.505	0.349	**0.933**

* Diagonal elements are the square roots of the AVE of each construct.

Table 4 shows the loadings and cross loadings where all items load much higher on their specified constructs than on other constructs, further suggesting sufficient discriminant and convergent validity for all constructs used in this study (Straub et al., 2004).

TABLE 4. Loadings and cross loadings.

	ATTF	ENJHO	PEREN	SENSW	USAKC	USAKS
ATTF1	**0.896**	0.442	0.651	0.422	0.411	0.449
ATTF2	**0.914**	0.481	0.680	0.490	0.441	0.482
ATTF3	**0.910**	0.432	0.637	0.428	0.451	0.416
ATTF4	**0.890**	0.397	0.640	0.371	0.468	0.408
ENJHO1	0.426	**0.899**	0.468	0.619	0.497	0.373
ENJHO2	0.451	**0.950**	0.478	0.670	0.487	0.381
ENJHO3	0.442	**0.907**	0.454	0.699	0.355	0.440
ENJHO4	0.467	**0.917**	0.475	0.686	0.399	0.404
PEREN1	0.628	0.482	**0.889**	0.459	0.311	0.474
PEREN2	0.713	0.442	**0.890**	0.408	0.385	0.486
PEREN3	0.647	0.490	**0.928**	0.492	0.327	0.504
PEREN4	0.613	0.426	**0.899**	0.439	0.276	0.481
SENSW1	0.418	0.695	0.457	**0.920**	0.324	0.457
SENSW2	0.448	0.682	0.459	**0.931**	0.363	0.453
SENSW3	0.448	0.684	0.465	**0.926**	0.376	0.475

SENSW4	0.465	0.671	0.492	**0.923**	0.372	0.491
SENSW5	0.406	0.616	0.420	**0.909**	0.371	0.451
USAKC1	0.463	0.502	0.373	0.396	**0.952**	0.357
USAKC2	0.479	0.451	0.348	0.375	**0.973**	0.338
USAKC3	0.462	0.402	0.307	0.348	**0.935**	0.298
USAKS1	0.374	0.382	0.497	0.455	0.183	**0.887**
USAKS2	0.435	0.376	0.492	0.476	0.280	**0.945**
USAKS3	0.492	0.403	0.455	0.421	0.467	**0.842**

Common Method Bias

It is suggested that using single source, self-reported data may have the potential for common method bias, while obtaining data from different sources can help reduce common method variance (CMV). Harman's single-factor test is arguably the most extensively applied approach for assessing CMV (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The data in our study were collected from different sources, which is helpful for reducing CMV. Harman's single factor test was performed with the complete data set by conducting a principal components analysis (PCA) in SPSS. The factor solution resulted in 6 factors with eigenvalues greater than 1.0, accounting for 84.69% of variance. At the same time, the first factor accounted for 19.50% of the variance, indicating that this factor does not account for the majority of the variance (Podsakoff et al., 2003).

Furthermore, following Podsakoff et al. (2003) and Liang et al. (2007), we included in the PLS model a common method factor whose indicators included all the principal constructs' indicators. "For each single-indicator construct, we examined the coefficients of its two incoming paths from its substantive construct and the method factor" (Liang et al., 2007, p.87). As shown in Appendix C, for all the 23 items, most method path coefficients are not significant. Meanwhile, the path coefficients of substantive constructs are substantially greater than their method path coefficients, thus explaining substantially greater variance of items than method. So, we contend that common method bias is not a concern in this study.

Structural Model with Results

The bootstrap is described as "a computer-based method for assigning measures of accuracy to statistical estimates" and the usual measure of accuracy for statistical quantities is the standard error (Shrout & Bolger, 2002, p.443). In traditional methods, "a standard error is usually estimated from equations that are derived from a series of assumptions and mathematical operations" (ibid). For the bootstrap method, it "involves having a computer program generate a series of data sets (bootstrap samples) that are designed to resemble the ones that would be observed if the estimation study were repeated many times. Each bootstrap data set is obtained by sampling (with replacement) from the original data" (ibid.). Thus, bootstrap procedures can draw repeated random samples from the dataset and use these samples to estimate standard errors and calculate t statistics for inferential purposes (Stine, 1989; Wetzels, Odekerken-Schroder, & van Oppen, 2009; Chin et al., 2003). Specifically, bootstrap procedures have greater power and accuracy for detecting mediating effects (Shrout & Bolger, 2002).

The structural model with results is presented in Figure 2. Tests of significance were performed using the bootstrap resampling procedure with 1000 samples, following the

recommendation that the sample size should be at least 500 (Wetzels et al., 2009), so as to obtain the stable t values of the estimates.

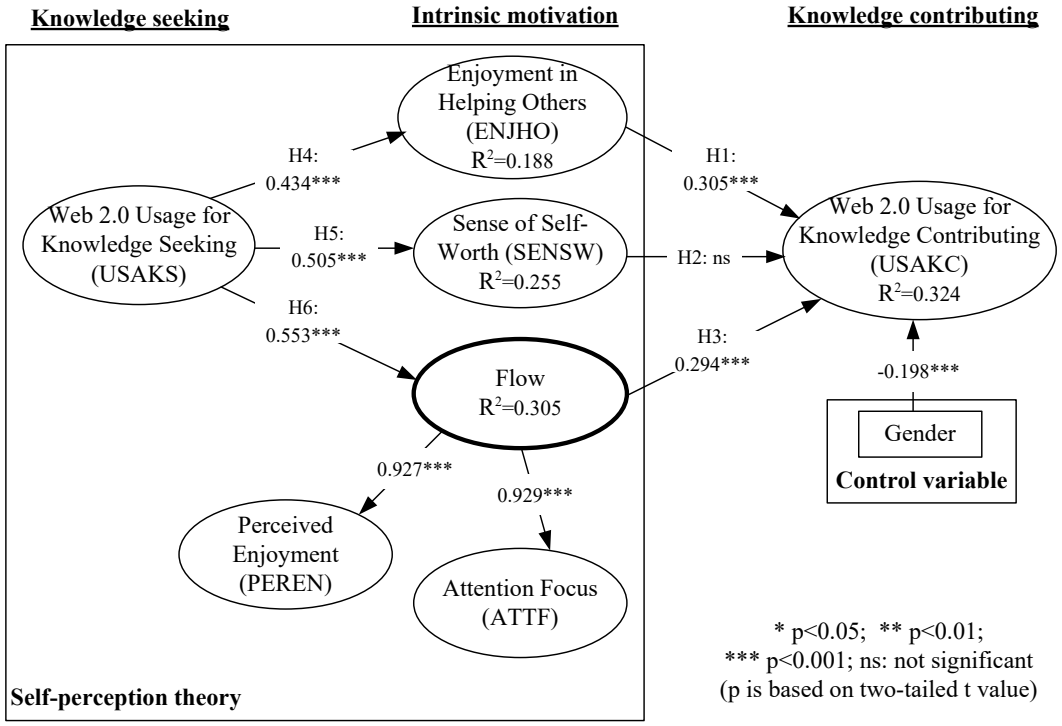

FIG. 2. Research model with results.

Following the work by Novak, Hoffman and Yung (2000), we treat flow in this study as a second-order construct reflected by perceived enjoyment and attention focus. Specifically, flow is proposed as a "reflective first-order and reflective second-order model" (Diamantopoulos, Riefler, & Roth, 2008, p.1206). For this indirect reflective second-order model, "the approach of repeated indicators known as the hierarchical component model" was used, i.e. "a second-order factor is directly measured by observed variables for all the first-order factors" (Chin et al., 2003, Supplemental Material, p.5).

From Figure 2, we can see that all the hypotheses except for H2 are supported. We included all the sample characteristic data in the model and found that only Gender had a significant impact on Web 2.0 Usage for Knowledge Contributing. We thus verified our theoretical model by treating Gender as a control variable. In the data analysis, male is coded as 1 and female is coded as 2. The impact of Gender on Web 2.0 Usage for Knowledge Contributing is negative, suggesting that female employees are less likely to contribute on the Web 2.0 application while male employees are more likely to contribute.

From Table 3, we can see that the correlation between SENSW and USAKC is 0.393, suggesting that independent effect of SENSW on USAKC is significant. But, from Figure 2, we can see that H2 is not significant, implying that ENJHO captures all the information in SENSW given the correlation between them is 0.727, so that once ENJHO is included in the model, there is no effect of SENSW on USAKC. In other words, ENJHO is very strong and overpowers SENSW.

From Figure 2, we can see that the explained variance of Web 2.0 Usage for Knowledge Contributing is 0.324, suggesting that intrinsic motivation plays determinant role in predicting

knowledge contributing. Meanwhile, knowledge seeking has effect on all the intrinsic motivation; especially can better predict Flow with the explained variance being 0.305. As a whole, this research model shows a good predictive validity (Straub et al., 2004).

Discussion and Implications

Mediating Role of Intrinsic Motivation

The results provide evidence for the hypothesized mediating role of intrinsic motivation between knowledge seeking and knowledge contributing. To test these mediating effects, we followed the procedure reported in Liang et al. (2007). We first examine the direct effect of knowledge seeking on knowledge contributing. From the base model of Figure 2, a knowledge seeking and knowledge contributing link was added (with other links from intrinsic motivations to knowledge contributing simultaneously included) while the original links from knowledge seeking to intrinsic motivations were all removed. The link directly from knowledge seeking to knowledge contributing was found to be significant ($b=0.138$, $p<0.01$). Then we tested the mediating effect of each intrinsic motivation starting from this model.

(1) We connected knowledge seeking to ENJHO and ran the model. The link from knowledge seeking to ENJHO is significant ($b=0.437$, $p<0.001$) and the link from ENJHO to knowledge contributing is significant ($b=0.302$, $p<0.001$), while the link from knowledge seeking to knowledge contributing is insignificant ($b=0.098$), suggesting the mediating role of ENJHO between knowledge seeking and knowledge contributing.

(2) We removed the link from knowledge seeking to ENJHO and connected knowledge seeking to Flow and ran the model. The link from knowledge seeking to Flow is significant ($b=0.556$, $p<0.001$) and the link from Flow to knowledge contributing is significant ($b=0.254$, $p<0.001$), while the link from knowledge seeking to knowledge contributing is insignificant ($b=0.092$), suggesting the mediating role of Flow between knowledge seeking and knowledge contributing.

(3) We removed the link from knowledge seeking to Flow and added the link from knowledge seeking to SENSW and ran the model. The link from knowledge seeking to SENSW is significant ($b=0.504$, $p<0.001$) while the link from knowledge seeking to knowledge contributing is insignificant ($b=0.085$). Considering that the effect of SENSW on knowledge contributing is overpowered by ENJHO, we further removed ENJHO from the model to better understand the mediating role of SNESW. In this case, the link from knowledge seeking to SENSW is significant ($b=0.504$, $p<0.001$), the link from SENSW to knowledge contributing is significant ($b=0.170$, $p<0.01$) while the link from knowledge seeking to knowledge contributing is insignificant ($b=0.087$), suggesting the mediating role of SENSW between knowledge seeking and knowledge contributing.

According to the test above, we can see that all intrinsic motivations each fully mediate the impact of knowledge seeking on knowledge contributing. This means, when including intrinsic motivation in the model, the direct effect of knowledge seeking on knowledge contributing is not significant, suggesting an indirect impact of knowledge seeking on knowledge contributing. Consequently, knowledge seeking behavior impacts intrinsic motivation beliefs which further impacts knowledge contributing behavior, concordant with the principle that the relationship

between behavior and beliefs is one of mutual influence (Melone, 1990; Song et al., 2009).

Causal Direction Analysis

Cohen, Ballesteros, Carlson and Amant (1993) proposed using the total squared error (TSE) as the criterion to evaluate and compare the goodness of the proposed causal model and other competing models. The rationale and criteria underlying this method is that the estimated correlations based on path analysis should be as close as possible to the actual correlation (Sun & Zhang, 2006), i.e. for the model whose estimated and actual correlations accord relatively well, it would have a smaller TSE and thus become the best competing model to fit the data (Cohen et al., 1993).

Self-perception theory (Bem, 1972) is applied in this study to explore the behavioral transfer from knowledge seeking to knowledge contributing. In order to prove that knowledge seeking is the starting point by users on the Web 2.0 application, we set up another competing model from our base model to explore the causal direction between knowledge seeking and knowledge contributing, viz. from knowledge contributing to intrinsic motivations and then to knowledge seeking (see Figure 3).

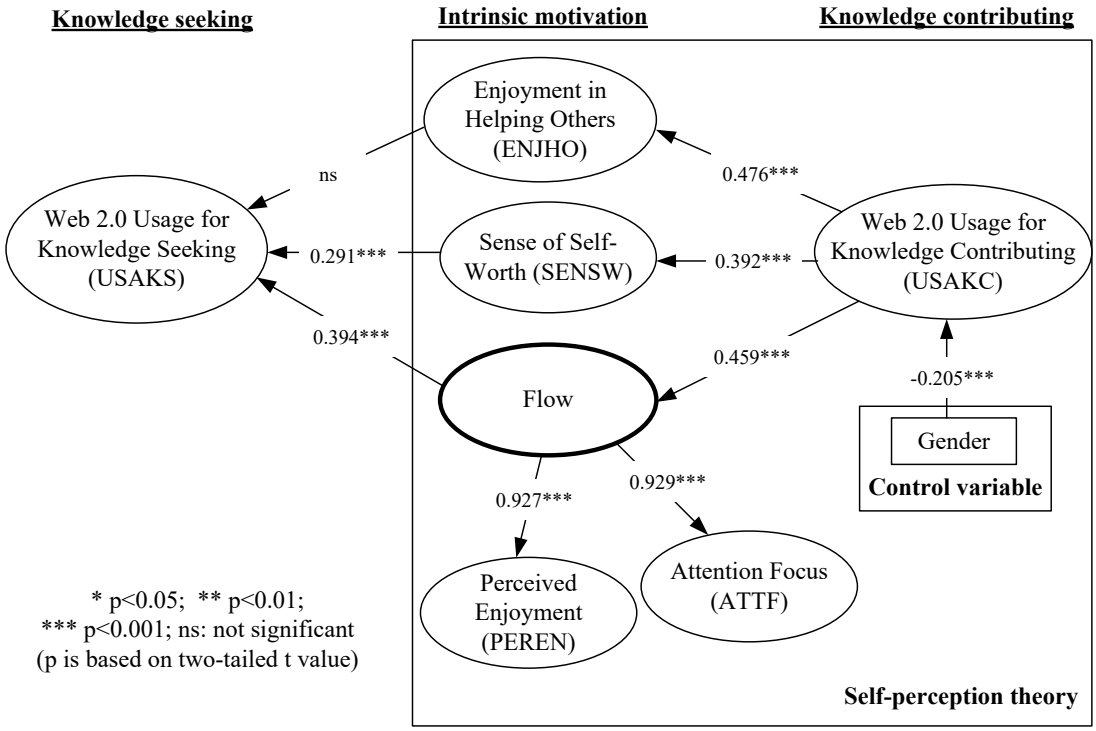

FIG. 3. Competing model.

The TSE are calculated to compare this model and the original one (Figure 2). The results (Appendix D) show that the proposed theoretical model (original model) has a smaller TSE than this competing model. So, this causal direction analysis supports the theoretical model in this study that knowledge seeking leads to intrinsic motivation and further knowledge contributing rather than vice versa. Just as hypothesized, intrinsic motivations play roles both as the precursors of knowledge contributing and the consequences of knowledge seeking.

Implications for Theory

Self-perception theory is applied in this study and we believe that the current research usefully contributes to the theoretical development of the structural model exploring behavioral transfer from knowledge seeking to knowledge contributing in the specific context of Web 2.0 and other context more generally. Our causal direction analysis indicates the exact nature of the behavioral transfer from knowledge seeking to knowledge contributing rather than vice versa.

Implications for Practice

Intrinsic motivation involves performing an activity and engaging in it for the sake of the activity itself rather than for external rewards (Baer et al., 2003; Wasko & Faraj, 2005). In the context of Web 2.0 virtual communities, where people typically don't know one another or don't necessarily expect to meet face-to-face, we suggest the intrinsic motivating factors to engage in knowledge exchange are most likely to become salient. In this study, we examine three kinds of intrinsic motivations, viz.: enjoyment in helping others, sense of self-worth, and flow. However, it is not reasonable to believe that individuals can naturally reach a kind of high level of intrinsic motivation. Inspired by self-perception theory, which posits that individuals come to 'know' their own internal states by inferring them partially from observations of their own overt behavior (Bem, 1972), we explore behavioral transfer from knowledge seeking to knowledge contributing and consider the mediating effect of these intrinsic motivations. The causal direction analysis and mediating effect analysis support the theoretical model in this study, presenting the exact nature of knowledge sharing mental rules and behavioral patterns by employees. We suggest that the findings of this study in the context of Web 2.0 virtual communities also have implications for knowledge sharing practices in organizational contexts.

In organizational contexts, many employees, especially in the Chinese culture, hold a strong belief that knowledge contributing means losing knowledge power. In the Chinese business culture, information and knowledge are key sources of power. Fundamentally, they are treated as personal assets rather than an organizational resource and personal power is maintained by carefully controlling key information and knowledge (Martinsons & Westwood, 1997). Consequently, knowledge sharing activities often encounter challenges and may eventually fail in Chinese organizations (Davison, Ou, & Martinsons, 2012). We believe that Web 2.0 virtual communities provide informal yet efficient platforms for knowledge sharing activity where employees can exchange knowledge with outside people who share common interests, goals, needs or practices with them, compared with the formal (and expensive) KMS used or expected to be used inside organizations.

Moreover, given that "most organizations do not possess all the required knowledge within their formal boundaries and must rely on linkages to outside organizations and individuals to acquire knowledge" (Wasko & Faraj, 2005, p.36) and informed by one respondent in our qualitative interview who commented "with the development of Web 2.0, more and more users would depend on it and desire to share knowledge with other users urgently", we recommend that organizations should encourage their employees to go beyond the organizational boundary to seek knowledge on Web 2.0 virtual communities. Indeed, sharing knowledge is an important aspect of membership of a virtual technological community (Bouty, 2000). A key motivation to participate in virtual communities is to seek knowledge relevant to problems encountered at work yet unavailable within the organizational context (Chiu et al., 2006; Wasko & Faraj, 2005). In addition, these forms of knowledge exchange that cross organizational boundaries can be informal and free

from the constraints of local hierarchy, thus stimulating innovative thinking which has the potential to result in new value for the organization (Wasko & Faraj, 2005). Our study indicates that frequent seeking of knowledge on Web 2.0 virtual communities by employees can facilitate the formation of their intrinsic motivation. Even though our study is limited to the context of Web 2.0 virtual communities, we argue that the high level of intrinsic motivations, such as enjoyment in helping others, experienced by employees is most likely to drift beyond the Web 2.0 virtual context, and may facilitate knowledge sharing initiatives in the organizational context, thus benefiting the whole organization.

Knowledge contributing has long been identified as a bottleneck since individuals are likely to consider that their contributions would not be worth the effort, given high levels of expectation to receive some value in return (Wasko & Faraj, 2005). Extrinsic rewards can be regarded as a kind of value in return, but according to Bock et al. (2005, p.98), the "need for extrinsic rewards may very well hinder - rather than promote - the development of favorable attitudes toward knowledge contributing". We thus suggest that compared with extrinsic rewards, knowledge seeking itself represents a kind of knowledge reward, since the reason why users choose to seek knowledge is that other users are contributing. Users of a Web 2.0 virtual community are most likely to use it initially in order to seek knowledge from rather than contribute knowledge to the community. Moreover, they can't become avid users from the outset. We thus recommend that at early stage of Web 2.0 virtual community development, there should be a group of experts who play the role of contributors. This should already be the case with some popular Web 2.0 virtual communities in China. Indeed, there is evidence to show this in our structured observations where, among the active users we observed, two users often contributed more than 100 times a day, essentially functioning as experts.

In the organizational context, a group of experts at early stages in the development of a knowledge management system can usefully demonstrate how a knowledge management system can offer "relevant, accurate, and timely knowledge" and so render to a company the ability to engage in "effective problem solving and decision making" (He & Wei, 2009, p.826). Consequently, no matter whether in the context of the Web 2.0 virtual community or the organizational context of KMS, when users can get answers each time they seek, they are most likely to depend on the application and increase their usage of it over time, thus gradually developing the 'strong' ties with other users (Kang, Kim, Gloor, & Bock, 2011). According to the findings of our study, if users rely on this application to seek knowledge more frequently, they would be more likely to have higher levels of intrinsic motivation which further facilitates knowledge contributing. When more and more users become avid at knowledge seeking and knowledge contributing, the contributor domain can successfully develop from the seed of the expert group to a critical mass of normal users. In this way, the ideal stage can be attained, with a knowledge management system spiraling continually upwards and dynamically maintained by the normal users themselves due to the increasing number of voluntary contributors (He & Wei, 2009). Only in this way can the quality of knowledge be guaranteed, the real meaning of knowledge sharing initiative be signified, with the result that organizations can reap significant rewards.

Conclusion

Compared with Western countries, knowledge management initiatives in China are

encountered relatively less frequently. However, with the development of Web 2.0 applications, we see a useful platform for knowledge sharing. Self-perception theory is applied in this study to explore the behavioral transfer from knowledge seeking to knowledge contributing by employees. We found that knowledge seeking contributes to the formation of intrinsic motivation and further knowledge contributing. This is critical since this study traced back further along the causal chain of knowledge sharing activity to explore the precursor of intrinsic motivation, i.e. knowledge seeking. We make recommendations for knowledge management strategy accordingly. Considering that cultural factors such as face-saving, face-gaining, and guanxi orientation exert key impacts on knowledge contributing (Huang et al., 2008), we suggest that further study is needed to explore the precursors of these cultural factors. We believe this further study would lead to more interesting findings which would usefully complement the current study.

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Appendix A

Constructs and Items.

Constructs	Definitions	Items
Attention Focus (adapted from Koufaris, 2002)	The extent to which an individual is able to focus on the Web 2.0 application only when using it	1. When using the Web 2.0 application, I am absorbed intensely in the activity. 2. When using the Web 2.0 application, my attention is focused on the activity. 3. When using the Web 2.0 application, I concentrate fully on the activity. 4. When using the Web 2.0 application, I am deeply engrossed in the activity.
Enjoyment in Helping Others (adapted from Kankanhalli et al., 2005)	The perception of pleasure obtained from helping others through knowledge contributing	1. I enjoy sharing my knowledge with others through the Web 2.0 application. 2. I enjoy helping others by sharing my knowledge through the Web 2.0 application. 3. It feels good to help someone else by sharing my knowledge through the Web 2.0 application. 4. Sharing my knowledge with others through the Web 2.0 application gives me pleasure.
Perceived Enjoyment (adapted from Koufaris, 2002)	The extent to which the activity of using the Web 2.0 application is perceived to be enjoyable in its own right apart from any performance consequences	1. I feel that using the Web 2.0 application is fun. 2. I feel that using the Web 2.0 application is exciting. 3. I feel that using the Web 2.0 application is enjoyable. 4. I feel that using the Web 2.0 application is interesting.
Sense of Self-Worth (adapted from Bock et al., 2005)	The degree of one's positive cognition based on one's feeling of personal contribution to the Web 2.0 virtual community through knowledge contributing	1. My knowledge sharing would help other members on the virtual community solve problems. 2. My knowledge sharing would create new opportunities for other members. 3. My knowledge sharing would improve work processes of other members. 4. My knowledge sharing would increase productivity of other members.

		5. My knowledge sharing would help other members achieve their performance objectives.
Web 2.0 Usage for Knowledge Contributing (adapted from Kankanhalli et al., 2005; Venkatesh et al., 2003)	The actual usage of Web 2.0 for knowledge contributing with respect to the frequency of use and the amount of time involved	1. I often use the Web 2.0 application to contribute my knowledge. 2. I frequently use the Web 2.0 to contribute my knowledge. 3. I spend a lot of time using the Web 2.0 application to contribute my knowledge.
Web 2.0 Usage for Knowledge Seeking (adapted from Kankanhalli et al., 2005; Venkatesh et al., 2003)	The actual usage of Web 2.0 for knowledge seeking with respect to the frequency of use and the amount of time involved	1. I often use the Web 2.0 application to seek knowledge. 2. I frequently use the Web 2.0 application to seek knowledge. 3. I spend a lot of time using the Web 2.0 application to seek knowledge.

Appendix B

Interview questions.

1. Which Web 2.0 application do you use most frequently?
2. Do you often visit this Web 2.0 application to seek knowledge? Why?
3. Do you often contribute your experience and knowledge to this Web 2.0 application? Why?
4. Do you think it is enjoyable to visit this Web 2.0 application? Why?
5. Do you think it is enjoyable to help others by answering questions other members of the Web 2.0 application asked? Why?
6. Do you feel that you gain a sense of self-worth when you answer questions other members of the Web 2.0 application asked? Why?
7. What role do you think you can (or plan to) play in the development of this Web 2.0 application?
8. Are there any other issues that you would like to tell us about?

Appendix C

Common method variance.

Common method bias analysis in PLS			
Construct	Indicator	Substantive path coefficient	Method path coefficient
ATTF	ATTF1	0.897***	-0.002
	ATTF2	0.835***	0.099**
	ATTF3	0.936***	-0.032
	ATTF4	0.944***	-0.067
ENJHO	ENJHO1	0.893***	-0.000
	ENJHO2	0.968***	-0.025

	ENJHO3	0.904***	0.009
	ENJHO4	0.906***	0.017
	PEREN1	0.875***	0.018
PEREN	PEREN2	0.856***	0.039
	PEREN3	0.916***	0.017
	PEREN4	0.959***	-0.074*
	SENSW1	0.938***	-0.019
	SENSW2	0.936***	-0.005
SENSW	SENSW3	0.901***	0.028
	SENSW4	0.866***	0.066*
	SENSW5	0.968***	-0.072*
	USAKC1	0.915***	0.052**
USAKC	USAKC2	0.977***	-0.007
	USAKC3	0.968***	-0.046*
	USAKS1	0.928***	-0.053
USAKS	USAKS2	0.982***	-0.050*
	USAKS3	0.759***	0.110**

Notes: *p<0.05; **p<0.01; ***p<0.001

Appendix D

Causal direction analysis.

Original Theoretical Model (Figure 2: From seeking to contributing)		Total Squared Error: 0.206	
Causal Relations	Estimated Correlation	Actual Correlation	Squared Error
USAKS→ ENJHO	0.434	0.434	0.000
USAKS→SENSW	0.505	0.505	0.000
USAKS→Flow	0.553	0.553	0.000
USAKS→USAKC	0.299	0.349	0.002
ENJHO→USAKC	0.305	0.476	0.029
SENSE→USAKC	0.009	0.393	0.147
Flow→USAKC	0.294	0.459	0.027
Gender→USAKC	-0.198	-0.205	0.000
Competing Model (Figure 3: From contributing to seeking)		Total Squared Error: 0.252	
Causal Relations	Estimated Correlation	Actual Correlation	Squared Error
USAKC→ ENJHO	0.476	0.476	0.000
USAKC→SENSW	0.392	0.392	0.000
USAKC→Flow	0.459	0.459	0.000
USAKC→USAKS	0.300	0.348	0.002
ENJHO→USAKS	0.010	0.434	0.179
SENSE→USAKS	0.291	0.505	0.046
Flow→USAKS	0.394	0.553	0.025
Gender→USAKC	-0.205	-0.205	0.000