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AN INVESTIGATION INTO CONTRIBUTION I-INTENTION AND WE-INTENTION IN OPEN WEB-BASED ENCYCLOPEDIA: ROLES OF JOINT COMMITMENT AND MUTUAL AGREEMENT

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Abstract

In the current study, knowledge contribution in open web-based encyclopedia is conceptualized as a group-referent intentional social action, and we-intention, which reflects one's perception of the group acting as a unit, has been employed. The motivation of this study thus is to better understand antecedents and consequences of contribution I-intention and we-intention in open web-based encyclopedia. A research model was developed and empirically examined with 202 knowledge contributors in two most famous wiki communities in Mainland China. The results demonstrated that personal outcome expectations exert significant effects on both intentions. Joint commitment, mutual agreement and community-related outcome expectations are significantly related to we-intention to contribute, but not related to I-intention. In addition, we-intention has a statistically significant positive effect on contribution behavior. However, I-intention negatively relates to contribution behavior. We believe this study will serve as a starting point for furthering our limited understanding of the intentional social action in knowledge management research.

Keywords: I-intention; we-intention; knowledge contribution, joint commitment; mutual agreement, social cognitive theory, wiki community

Introduction

The advent of Web 2.0 greatly changes the way people collaborate and communicate in their daily life. In addition, it also aggregates the wisdom of crowds in collaborative content creation. One of the distinguishing traits of Web 2.0 is its emphasis on the collective efforts in the development, deployment and use of the technology. The activities in Web 2.0 have meaning only if other participants are acting in concert, and in this sense, people's decisions to participate, to some extent, are interdependent (Li et al. 2005). In recent years, the significance of Web 2.0 technologies in knowledge management is more evident with both qualitative and quantitative research investigating this issue (Schroer and Hertel 2009; Wagner 2004). However, some studies have also found that Web 2.0 itself does not always result in the satisfactory outcomes. For example, a study addressing an unsuccessful implementation of wiki-based collaboration indicated that the failure is usually little to do with the technology itself but is instead due to a lack of a strong wiki community with collective participation (Davies 2004). Recent empirical studies on Web 2.0 community, however, still focused on the individual intention (I-intention) but neglected the nature of interdependence among all participants. It is obvious that collective perceptions and efforts involved in the intention formation process deserve more attention in current research. In this regard, this study tries to investigate the differences between I-intention and we-intention, and further identify the possible antecedents and consequences of the two kinds of intention.

Among the commonly mentioned Web 2.0 technologies, open web-based encyclopedia is one of the most popular and widely spread instances. It creates online spaces for collaborative authoring and makes the online free content can be accessed by anyone around the world. The articles are written collaboratively and entirely by volunteers and any visitors can modify an article at any time via the Internet. In this sense, the goal of open web-based encyclopedia is to make the world's knowledge available immediately to anyone, and ultimately benefit the society. In addition, open web-based encyclopedia also satisfies most of the needs for both knowledge seeker and contributors (Wagner 2004). For example, incremental knowledge creation allows users to create knowledge content that is incomplete and then rely on others to improve the content. Power of N allows participants to help each other in modifying the content and thus work as a cohesive team. Centralized, web-based resource enables multiple users to collaborate whenever and wherever on centralized common knowledge repository. As an important part of open web-based encyclopedia, WikiProject serves as a central place for gathering a core group of contributors to a specific topic or a family of topics. It encourages team collaboration on encyclopedic work and helps to produce excellent articles systematically, rather than incidentally. WikiProject also requires greater cooperation and collaboration among group of people with common interests and concerns. In addition to the actual production of encyclopedic articles, a lot of teamwork also needs to be done within a WikiProject. According to the explanation given by Wikipedia, what distinguishes a successful WikiProject is that it functions more as a cohesive group of editors working towards a common goal. Therefore, encyclopedic work in WikiProject can be referred as a fully cooperative group action (Bagozzi and Dholakia 2002). Since WikiProject can better harness the wisdom of crowds in creating encyclopedic articles of various themes, this study thus focuses on volunteers' knowledge contribution in WikiProject.

The rest of this paper is organized as follows. In the next section, we provide a review of the relevant literature that constitutes the theoretical background of this study. We then present our research model and describe the research method. This is followed by data analysis and results of this study. Finally, we discuss the key findings and limitations of this study, as well as the implications for both research and practice.

Theoretical Background

This section provides a review of the relevant literature that forms the basis of this study. Specifically, we discuss prior academic studies on open web-based encyclopedia, give a detailed review of we-intention research to date and review previous studies on social cognitive theory.

Academic Studies on Open Web-based Encyclopedia

With the popularity and success of open web-based encyclopedia, many scholars have begun to pay more attention to this emerging field. Generally speaking, these researchers can be grouped into two categories. The first research stream focuses on the production and reliability of the encyclopedia content, while the second stream of research efforts investigates social aspects in participation and contribution. The reliability and accuracy of the contents in online encyclopedia is always a major concern for scholars. For example, a Nature investigation (Giles 2005) found that science entries from Wikipedia were comparable in accuracy to those in Encyclopedia Britannica. In this investigation, four serious errors out of 42 articles were found in each, although articles in Wikipedia were often

"poorly structured". A recent study by Stvilia et al. (2008) also has demonstrated that Wikipedia takes issues of quality very seriously, and the content in Wikipedia is carefully evaluated and reviewed. Lots of work has been done on social aspects of participation and contribution in open web-based encyclopedia. According to a recent report from Pew Internet & American Life Project (Rainie and Tancer 2007), more than one third (36%) of the American adults Internet users consult Wikipedia and nearly half (44%) of online Americans ages 18-29 use Wikipedia to look for information. Some other studies focused on the motivations of voluntary contributors. In a survey of 151 heavy Wikipedia contributors, Nov (2007) found that fun and ideology are the strongest motivations for contributing to Wikipedia, whereas career promotion and social motives ranked the lowest. This may be due to the fact that software contributors in open source initiatives concentrate more on reputation gaining and self-development, whereas content contributors put the stress more on altruistic motives (Oreg and Nov 2008). Wagner and Prasarnphanich (2007) also argued in a similar vein that collaborative (altruistic) motives dominate wiki-based innovative content creation. Schroer and Hertel (2009) further surveyed 106 contributors in the German Wikipedia and the results revealed that contributors' engagement is determined by tolerance for opportunity costs as well as task characteristics. They suggested that a favorable task experiences may counter opportunity costs perceived by Wikipedia contributors.

We-Intention

In the past two decades, philosophical studies have investigated the nature of collective action through different perspectives. Specifically, philosophers have made significant efforts to the concept of collective intention. There are two kinds of collective intention (Bagozzi 2007; Bagozzi and Lee 2002). One kind of collective intention is actually an individual's intention to perform a group activity with a group of people. The group activity here is regarded in an atomistic sense and members of the group act individually to contribute to the group performance. The other qualitatively different form of collective intention is termed we-intention, where an individual views the group action holistically and it is the group that acts as a unit or a person that acts as an agent of the group. In this sense, we-intention is often defined as a "commitment of an individual to participate in joint action, and involves an implicit or explicit agreement between the participants to engage in that joint action" (p.2, Tuomela 1995). Tuomela later has identified four presumptions for we-intention to occur: (1) a member of a collectivity intends to perform his or her own part contributory to the group action; (2) each member believes that the joint action opportunities, to some extent, exist and other members will perform their parts, in addition, (3) there is a mutual belief among all the participants that the opportunities for joint action will obtain, and finally, (4) the intention to perform one's own part depends on (2) and (3). In addition, Tuomela (2005) maintained that the beliefs required for we-intention are purely subjective and represent one's own perception of the reality. Therefore, if the above conditions are satisfied, a member can even be the only agent with we-intention in a focal group (Bagozzi and Dholakia 2002). In this regard, we-intention can be considered as an individual's subjective perception of the extent to which all participants in a collectivity will engage in the joint action together.

As shown in Table 1, prior studies have identified several unique characteristics that distinguish we-intention from I-intention (Tuomela 1995). First of all, as we discussed above, I-intention refers to one's own decision to perform an action, and accordingly the subject of the intention is a single person. However, plural subjects are involved for we-intention to occur. An individual conceives him/herself as a member of a particular group or a social category and the intention is perceived by an individual as group intention obtained by all participants. Second, it is obvious that I-intention is privately accepted by an individual to achieve a personal goal, whereas for we-intention, it is the group that performs an activity which is accepted by all members in the focal group. Third, it is also worth noting that joint commitment and mutual agreement are two most important features of we-intention. If group members are jointly committed to performing a collective action and reach a mutual agreement on such behavior, there will be publicly mutual interdependent promises among all the participants. In this case, each member cannot be released from the mutual obligation merely by changing his/her own mind. This leads to the fourth distinction, that is, people have different authority over the target behavior under the two kinds of intention. In the I-intention context, since an individual is the sole author or creator of the intention, he/she has full authority to unilaterally rescind it. But for we-intention, the intention must be rescinded by all participants together. Otherwise it cannot be rescinded. Fifth, satisfaction conditions are different between I-intention and we-intention. It supposes that simultaneous satisfaction is another central feature especially for we-intention. If the intention content is satisfied for one member, it should be satisfied for all the members in the group. Finally, the joint action opportunity must be obtained with some nonzero probability for we-intention to occur. Thus group member should believe that not only he/she will perform his/her own part of the collective action, but also with some probability other members will perform their parts together.

Table 1. Distinctions between I-Intention and We-Intention

	I-Intention	We-Intention
Main Targets	*Singular subject*	*Plural subjects*
Goal Achievement	*Privately accepted*	*Collectively accepted*
Commitment	*Individual commitment*	*Joint commitment*
Agreement	*Personal agreement*	*Mutual agreement*
Behavioral Control	*Full authority*	*Shared authority*
Satisfaction Conditions	*Satisfaction for an individual*	*Simultaneous satisfaction*
Joint Action Opportunity	*Not necessary*	*Necessary*

As we discussed before, collective intention can be in the form of both we-intention and I-intention to perform a group activity (Bagozzi 2007). The two kinds of intention may co-exist in some contexts. However, they refer to different types of conceptual schemes (Gilbert 1989). This is because I-intention to perform a group action implies that an individual conceives of the action as performing a personal activity individually to contribute to the group performance, whereas we-intention to perform a group action implies that an individual conceives of the action as a group action in which one is a member of the group and the action is conceived as the group acting or experiencing an event (Bagozzi and Lee 2002). In the context of online community, I-intention refers to one's own decision to participate in and contribute to the community, regardless of others' simultaneous behavior. However, we-intention means that an individual conceives him/herself as a member of the community and believes that all participants in the community will act together as a unit. For some social computing technologies, such as Wikipedia and del.icio.us, I-intention and we-intention may exist simultaneously because these technologies themselves are rather useful and one can use them to achieve both individual and group goals.

Discussion on this topic continues to grow, with many scholars in other disciplines begin to explore this area. As pioneers in this field, Bagozzi and his colleagues have published extensively on the concept of we-intention. Both individual (e.g., attitude, perceived behavioral control, anticipated emotions, desires) and social factors (e.g., group norms, social identity, social presence) are regarded as the key predictors of we-intention (Bagozzi and Dholakia 2002; Bagozzi and Lee 2002; Cheung et al. 2010; Dholakia et al. 2004; Shen et al. 2010). In addition, there are several moderators that influence the relationships. For example, a cross-cultural study concluded that we-intention is determined by social identity in interdependent-based culture, whereas by group norms in independent-based culture (Bagozzi and Lee 2002). Gender and experience have also been found to be the important moderators in we-intention models (Bagozzi and Dholakia 2006; Shen et al. 2009; 2010). Results indicated that the effects of group norms on we-intention are more important for men and for users with lower usage experience, whereas the effects of social identity on we-intention are more significant for women and for users with higher usage experience. In a recent special issue aiming at how IS field needs to change, Bagozzi (2007) further demonstrated that it is necessary to respecify intentions when decisions involve "mutual, shared, or in some other way joint processes" (p. 249).

Social Cognitive Theory

Social cognitive theory defines human behavior as a triadic, dynamic and reciprocal interaction of personal factors, behavior and external environment. It provides a theoretical framework for understanding, predicting and influencing human behavior and mental processes. Outcome expectation and self-efficacy are at the heart of social cognitive theory. Outcome expectations refer to "a judgment of the likely consequence such performances will produce" and self-efficacy is defined as "a judgment of one's ability to organize and execute given types of performances" (p. 21, Bandura 1997). The more positive the expected outcome is and the more confident individuals feel about performing a particular behavior, the more likely people will engage in such behavior. Social cognitive theory recently has been widely used to investigate knowledge contribution in virtual communities. In particular, some recent studies have found that both personal outcome expectations and community-related outcome expectations were important motives for knowledge contributors (Chiu et al. 2006; Hsu et al. 2007). Lu and Hsiao (2007) further claimed that knowledge self-efficacy and personal outcome expectations exerted significant effects on intention of sharing information on weblogs. Similarly, Lin (2007) surveyed 172 employees on knowledge sharing with their colleagues and the results

indicated that knowledge self-efficacy, reciprocal benefits and enjoyment in helping others were positively related to knowledge sharing attitudes and intentions. The lack of knowledge self-efficacy is often considered as the major reason explaining why people do not share knowledge with others in web-based discussion boards (Lee et al. 2006).

Research Model

Figure 1 depicts the research model investigated in the current study. This model integrates social cognitive theory and philosophical writing on collective intentionality. Prior studies have demonstrated that if individuals are not confident in their abilities to contribute, they will be unlikely to do so, especially in a voluntary context (Bandura 1982). Since WikiProject is a purely voluntary setting and our respondents are these people who have contributed to WikiProject before, the respondents may have a high level of self-efficacy. Otherwise they will not invest their time and effort on contributing. Based on this reasoning, self-efficacy is not a key factor in the current investigation context and has not been incorporated in our research model. This approach is also consistent with prior IS studies on knowledge sharing in virtual communities (e.g., Chiu et al. 2006). In the following sections, the constructs and their relationships are discussed in detail.

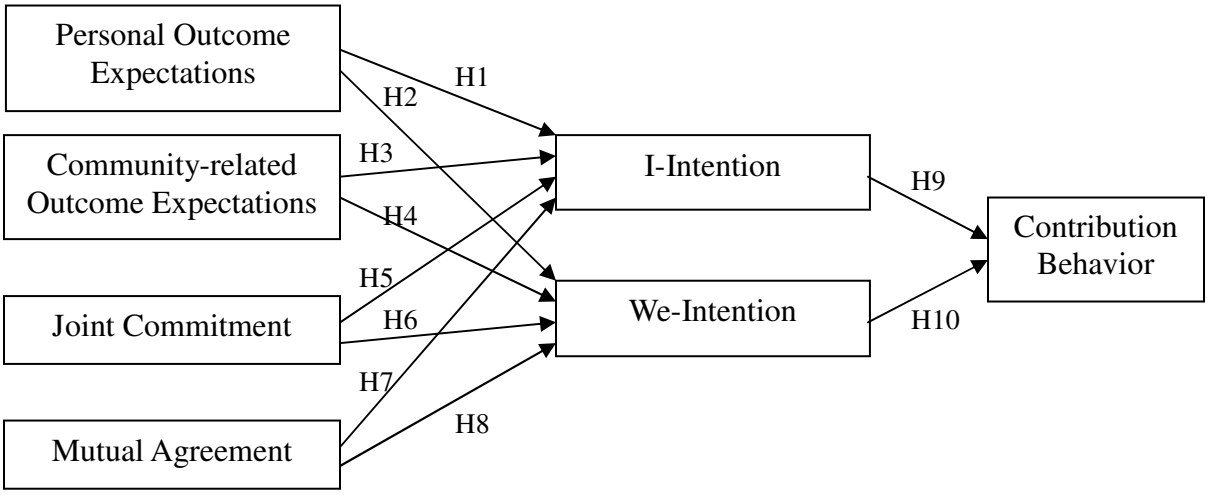


Figure1. Research Model

Effects of Outcome Expectations

Outcome expectations refer to an individual's belief regarding the consequences associated with his/her performance. An increasing number of studies have shown that the more positive the expected outcomes of a particular behavior, the more likely people will engage in that behavior (Chiu et al. 2006; Hsu et al. 2007; Lam and Lee 2006; Lin et al. 2008). Compeau et al. (1999) have identified two types of outcome expectations concerning individual computer use: personal and performance-related outcome expectations. Personal outcome expectations are associated with the changes in image, status or expectations of rewards, whereas performance-related outcome expectations relate to improvements in job performance with the use of computer. Based on Compeau's works (1995; 1999), some scholars recently have extended this concept and employed both personal and community-related outcome expectations to examine knowledge sharing behavior in virtual communities (Chiu et al. 2006; Hsu et al. 2007; Huang and Huang 2007; Kosonen 2009). In this study, personal outcome expectations refer to the judgment of a WikiProject knowledge contributor about the likely consequences that his/her contribution behavior will produce to him/herself alone. Community-related outcome expectations, on the other hand, refer to the judgment about the likely consequences that his/her contribution behavior will produce to the community as a whole. Some previous studies have demonstrated that expected personal benefits (e.g., rewards, image, reciprocity and enjoyment in helping others) exerted important impacts on knowledge sharing (Bock et al. 2005; Kankanhalli et al. 2005). Following prior empirical research, we assume that an individual will contribute to WikiProject only when they expect future possible returns, and he/she may contribute to the WikiProject both individually and collectively to achieve the anticipated benefits. Recent studies on virtual community-based collective action further suggested that people participate and share knowledge in electronic communities of practice because of both self-interest and community-interest (Wasko and Faraj 2000; 2005). When

knowledge is considered as a public good, people often behave more altruistically and pro-socially (Wasko and Faraj 2000). In this case, the concern for community foregoes the pursuit of self-interests and people will pay more attention to the growth and development of the community (Chiu et al. 2006; Hsu et al. 2007). In the current study, the motivation of contributing to WikiProject may be for the community as a whole rather than for narrow self-interest. Based on these considerations, we believe that people will contribute to WikiProject both individually in order to obtain current or future personal benefits and collectively in order to help the community enrich its knowledge, maintain its position and continue its operation. Therefore,

H1: Personal outcome expectations are positively related to I-intention to contribute to WikiProject.

H2: Personal outcome expectations are positively related to we-intention to contribute to WikiProject.

H3: Community-related outcome expectations are positively related to I-intention to contribute to WikiProject.

H4: Community-related outcome expectations are positively related to we-intention to contribute to WikiProject.

Effect of Joint Commitment

Gilbert (1989) believed that collective action is built on a kind of interpersonal commitment, which Gilbert described as "joint commitment". Different from personal commitment, which indicates that an individual is the sole author of a commitment and has the full authority to rescind his or her decision unilaterally, joint commitment implies a mutual expression of the readiness to be jointly committed and any participant cannot rescind the joint commitment simply by changing his/her own mind. Gilbert (1999) further demonstrated that joint commitment is not composed of a set of personal commitments independently created by each of the participants, but it refers to a single commitment collectively made by all participants to act as a body. In addition, it has been argued that joint commitment involves both obligations and rights (Gilbert 2006). The collective involvement in a joint commitment grants participants the rights to each other's conforming action, and each participant is also under an obligation to conform to the joint commitment. In the current study, joint commitment is defined as a common knowledge that all participants jointly express their readiness to be under the obligations to contribute to WikiProjects together. Prior studies indicated that joint commitment motivates individuals to share their private information with other teammates (Yen et al. 2006). Research investigating knowledge sharing in virtual communities also demonstrated that moral obligation is one of the most important motivators for knowledge exchange (Wasko and Faraj 2000). More important, Tuomela's definition of we-intention is closely related to commitment to participate in a joint action. Therefore, we believe that if people are jointly committed to contributing in WikiProject, there will be publicly-existing interdependent promises among them, and the promises will place themselves under an obligation to contribute together. Since the concept of joint commitment focuses more on collective perception and consciousness among all participants but I-intention to perform a collective action does not depend on others' behavior, joint commitment thus may not significantly relate to I-intention. Based on the discussion above,

H5: Joint commitment is NOT significantly related to I-intention to contribute to WikiProject.

H6: Joint commitment is positively related to we-intention to contribute to WikiProject.

Effect of Mutual Agreement

Mutual agreement refers to the agreement made by all participants regarding the specific details of interaction as a group (Dholakia et al. 2004). It is regarded as the mechanism through which participants move from the generally defined goals and conventions of a group to specific tasks and actions (Dholakia et al. 2004). Tuomela (1995) also has noted that cooperative scheme is established through commitment to engage in a joint action and explicit or implicit agreement between the participants to engage in that joint action. Although individuals may differ greatly in their underlying beliefs and values, each participant is motivated to achieve a mutual agreement that is acceptable to all parties (Raiffa et al. 2002). This is partly because through mutual agreement, people can choose group activities that promote their values and preferences (Howarth and Wilson 2006). Dryzek (2000) also made a similar claim that individuals' values and preferences are aggregated by mutual agreement. The importance of mutual agreement in collective action also attracts much attention in academic research. Prior studies have shown that social decision should be made through mutual consent of the participants (Howarth and Wilson 2006). Dryzek (2000) also demonstrated that a workable agreement based on shared values and norms would guide collective decisions. Specifically, Dholakia et al. (2004) further found that mutual agreement exerted a significant effect on participation we-intention in virtual communities. In this study, mutual agreement is defined as explicit or implicit consensus

among all participants over collectively contributing their knowledge to WikiProjects. Following these prior studies, we believe that if WikiProject members collectively reach an agreement on group's goals, tasks and desired outcomes, they will be more likely to work as a group in contributing to WikiProjects. Due to the same reasons that mutual agreement underlines collective perception among the participants, mutual agreement is hypothesized to be not significantly related to I-intention to contribute. Based on the discussion above,

H7: Mutual agreement is NOT significantly related to I-intention to contribute to WikiProject.

H8: Mutual agreement is positively related to we-intention to contribute to WikiProject.

Effects of I-intention and We-intention

Traditional individual intention refers to the strength of one's intention to perform an activity (Fishbein and Ajzen 1975). This definition implies that one's own decision does not depend on the intentions of others. In a more strict sense, it can be re-expressed as even if others do not perform this activity, an individual still intends to do it. In the current study, we use this statement to oppose the definition of we-intention and to develop our hypotheses. Lots of prior studies on knowledge contribution in virtual communities have addressed the relationship between intention and actual contribution behavior. In the current study, we believe that if members in WikiProject have an I-intention to contribute individually or a we-intention to contribute in concert with other participants, they will be more likely to actually contribute to WikiProject. Therefore,

H9: I-intention is positively related to knowledge contribution behavior in WikiProject.

H10: We-intention is positively related to knowledge contribution behavior in WikiProject.

Research Methodology

An online survey methodology was used for data collection in this study. Online survey was chosen because it is a fast, convenient and cost-efficient way of collecting a variety of related data and it also enhances the generalizability of results (Kankanhalli et al. 2005). More important, it helps to reach unique groups and individuals who share common interests and values regarding knowledge contribution in WikiProjects. The sections below describe in detail the operationalization of constructs, the data collection procedure and the sample characteristics.

Operationalization of Constructs

Table 2 provides operational definitions of the constructs. Most of the measures were adapted and extended using questions from prior studies to enhance validity. For those measures not available, new questions were developed based on a review of the relevant literature. To develop the psychometrically rigorous instruments, we followed the instrument development processes prescribed by Moore and Benbasat (1991). First of all, we created pools of items by identifying existing scales from literature and by creating additional items that appeared to fit the construct definitions through focus group discussion. After item creation procedure, four judges who were experienced users of WikiProjects were requested to do the card sorting. Since there are thirty items in the item pool, the card sorting process was simplified with names and definitions of the constructs provided to judges (Cheung and Lee 2001). They have to sort the questions based on the similarities and differences among the items, and place each question into a target category or an "other" category. Overall, as shown in Table 3, the four judges correctly placed 96.7% of the questions into the right categories. One judge has placed two mutual agreement questions (MA3 and MA4) in the "other" category. One we-intention item (WE2) was placed in the I-intention category and the "other" category. These questions were then reworded based on the suggestions from the judges. A pilot test was further conducted with fifteen IS students to refine questionnaire wordings, assess logical consistencies, judge ease of understanding and identify areas for improvement. Overall, they considered the questionnaire to be concise and easy to complete. They also made some suggestions on the format and wording of the questionnaire, and these suggestions were addressed in the revised version of the questionnaire. Table 4 lists the final items used in this study. Contribution behavior was measured by the frequency and the duration of contribution in WikiProject. All other questions were measured using seven-point scales anchored from "strongly disagree" to "strongly agree". Since this study was conducted in Mainland China, the questionnaire was translated into Chinese first, and then a backward translation method was used to ensure the consistency between the Chinese and the English version of the questionnaire.

Table 2. Operational Definitions of Constructs

Construct	Operational Definition
Personal Outcome Expectations (POE)	Knowledge contributors' judgment of the likely consequences that his or her contribution behavior will produce to him or herself.
Community-related Outcome Expectations (COE)	Knowledge contributors' judgment of the likely consequences that his or her contribution behavior will produce to the whole WikiProjects.
Joint Commitment (JC)	A common knowledge that all participants jointly express their readiness to be under the obligations to contribute to WikiProjects together.
Mutual Agreement (MA)	Explicit or implicit consensus among all participants over collectively contributing their knowledge to WikiProjects.
I-intention (INT)	The strength of one's intention to contribute in WikiProjects, regardless of others' contribution.
We-intention (WE)	An individual's subjective perception of the extent to which all participants in WikiProjects will contribute their knowledge together.
Contribution Behavior (CB)	The duration and frequency of contribution in WikiProjects.

Table 3. Results of Card Sorting

Target Category	Actual Category								Total	Hit Rate (%)
	POE	COE	JC	MA	INT	WE	CB	Other		
POE	32								32	100
COE		20							20	100
JC			16						16	100
MA				14				2	16	87.5
INT					12				12	100
WE					1	14		1	16	87.5
CB							8		8	100
Average										96.7

Data Collection

The survey was conducted using two most famous wiki communities – Baidu Baike and Hudong – in Mainland China. All participation in this study was voluntary yet motivated by 20 RMB for each successful respondent. An invitation email with a URL to the online questionnaire was sent to the potential respondents. A screening question was employed to identify the wanted respondents who have participated in WikiProjects before, and then they were asked to write down the titles of their WikiProjects and the nicknames of teammates they recently worked with. These instructions were designed to capture the group of people with whom the respondents have developed we-intentions to contribute together. Data collection at this stage measured personal/community-related outcome expectations, joint commitment, mutual agreement, individual intention and we-intention. Finally, a total of 1630 people viewed the questionnaire and out of which 325 respondents completed it. Another email invitation was sent four weeks later to the respondents who completed the first-stage survey to assess their actual contribution behaviors in WikiProjects and a total of 246 respondents participated in all two stages of data collection. Respondents' email addresses were used to match their answers across the two stages. To ensure data quality, we have removed 44 responses taken less than 10 minutes or checked on the same column for a whole block of items. Finally, we kept a total of 202 responses in the final sample and since an analysis of the samples from the two wiki communities revealed no significant differences in the composition of the respondents, responses were then combined as a single sample for further analysis.

Table 4. List of the Measures

Sources	Measurement Items	Loading
Personal Outcome Expectations (Adapted from Shim and Eastlick 1998)	POE1: If I contribute my knowledge to WikiProject, I will feel a sense of accomplishment.	0.789
	POE2: If I contribute my knowledge to WikiProject, I will feel a sense of belonging.	0.788
	POE3: If I contribute my knowledge to WikiProject, I will attain self-fulfillment.	0.837
	POE4: If I contribute my knowledge to WikiProject, I will gain self-respect.	0.821
	POE5: If I contribute my knowledge to WikiProject, I will be well-respected.	0.749
	POE6: If I contribute my knowledge to WikiProject, I will feel the excitement.	0.811
Community-related Outcome Expectations (Adapted from Hsu et al. 2007)	COE1: My knowledge contribution will help WikiProject achieve its goals or visions.	0.834
	COE2: My knowledge contribution will help WikiProject continue to operate.	0.812
	COE3: My knowledge contribution will help WikiProject improve the quality of entries in its knowledge base.	0.851
	COE4: My knowledge contribution will help WikiProject increase the quantity of entries in its knowledge base.	0.787
	COE5: My knowledge contribution will help WikiProject maintain its position among similar Chinese online encyclopedias.	0.792
Joint Commitment (New Scales Developed)	JC1: We (i.e., the group that I identified before) all know that all participants in WikiProject are jointly committed to performing their parts of the tasks.	0.837
	JC2: We (i.e., the group that I identified before) all know that all participants in WikiProject are jointly committed to contributing to WikiProject.	0.909
	JC3: We (i.e., the group that I identified before) all know that all participants in WikiProject are jointly committed to helping each other.	0.758
	JC4: We (i.e., the group that I identified before) all know that all participants in WikiProject are jointly committed to achieving the common goals.	0.777
Mutual Agreement (Developed based on Dholakia et al. 2004)	MA1: All participants in WikiProject collectively reach an agreement on contributing knowledge to WikiProject together.	0.829
	MA2: All participants in WikiProject collectively reach an agreement on working as a group in knowledge contribution.	0.893
	MA3: I strongly agree that we should contribute our knowledge to WikiProject as a group.	0.794
	MA4: Other group members strongly agree that we should contribute our knowledge to WikiProject as a group.	0.791
I-Intention (Developed based on Fishbein and Ajzen 1975)	INT1: Even if other group members in WikiProject do not contribute, I still intend to contribute my knowledge to WikiProject.	0.887
	INT2: Even if other group members in WikiProject do not contribute, I still predict I will contribute my knowledge to WikiProject.	0.943
	INT3: Even if other group members in WikiProject do not contribute, I still make an effort to contribute my knowledge to WikiProject.	0.896
We-Intention (Developed based on Bagozzi and Lee 2002)	WE1: We (i.e., the group that I identified before) intend to contribute our knowledge to WikiProject together.	0.911
	WE2: I intend that we (i.e., the group that I identified before) contribute our knowledge to WikiProject together.	0.937
	WE3: We (i.e., the group that I identified before) plan to contribute our knowledge to WikiProject together.	0.938

	WE4: We (i.e., the group that I identified before) share a common intention to contribute our knowledge to WikiProject together.	0.844
Contribution Behavior (Adapted from Limayem et al. 2007)	CB1: In the past month, how often did you contribute knowledge to WikiProject?	0.943
	CB2: In the past month, how many hours did you contribute knowledge to WikiProject?	0.950

Sample Characteristics

The final sample consists of a total of 202 respondents, out of which 141 were male (69.8%) and 61 were female (30.2%). A large majority of the respondents (62.4%) aged between 21 and 30. Half of them (53%) were students. Approximately 73.8% of the respondents had education beyond college level. Most of them (84.7%) have used Internet for more than 3 years. On average, 65.8% of the respondents have less than one-year contribution experience in open web-based encyclopedia and 68.8% of the respondents spent more than 3 hours on WikiProject every week. Table 5 describes the demographic profile of the respondents.

Table 5. Demographic Profile of the Respondents

Characteristics	Frequency (N=202)	Percentage (%)	Characteristics	Frequency (N=202)	Percentage (%)
Gender			**Work**		
Male	141	69.8	Students	107	53.0
Female	61	30.2	Freelance	26	12.9
Age			Job-holder	57	28.2
<=20	55	27.2	Other	12	5.9
21-25	92	45.5	**Experience with Internet**		
25-30	34	16.8	<3 years	31	15.3
>30	21	10.4	3-5 years	53	26.2
Education Level			5-7 years	57	28.2
Below high school	25	12.4	>7ears	61	30.2
High school	28	13.9	**Experience with Open Web-based Encyclopedia**		
College	40	19.8	<3 months	59	29.2
Undergraduate	96	47.5	3-6 months	41	20.3
Master	12	5.9	6-12 months	33	16.3
Ph.D. or above	1	0.5	>1 year	69	34.2

Data Analysis and Results

PLS-Graph (Partial Least Squares) version 3.00 was used to evaluate the hypothesized relationships. PLS (Wold 1989) is a second-generation multivariate technique, which can estimate the measurement model and the structural model simultaneously in one operation. Different from the covariance-based SEM (Structural Equation Modeling) approach (i.e., LISREL) that is more suitable for theory testing, the component-based SEM approach (i.e., PLS) is more predictive-oriented (Joreskog and Wold 1982) and is considered to be the most appropriate in the initial exploratory stages of theory development (Chin 1998). As we discussed earlier, this study tries to investigate the key differences between I-intention and we-intention, and thus it is exploratory in nature. Based on this reasoning, we have chosen PLS as the primary data analysis technique. Following the two-step analytical procedures (Hair et al. 1998), the measurement model was first examined and then the structural model was assessed.

Measurement Model

We assessed the measurement model by examining three forms of validity, including content validity, convergent validity and discriminant validity. Content validity was established by card sorting and pilot-testing the instruments. Convergent validity was assessed by examining the composite reliability and the average variance extracted (Hair et al. 1998). Composite reliability refers to the measurement for internal consistency and average variance extracted indicates the amount of variance captured by a construct as compared to the variance caused by the measurement error. A composite reliability of 0.70 or above and an average variance extracted of more than 0.50 are deemed acceptable

(Fornell and Larcker 1981). To improve the reliability of the corresponding construct, two questions (POE7 and POE8) with loadings less than 0.70 were deleted. As shown in Table 6, all measures exceed the recommended thresholds.

Discriminant validity indicates the degree to which measures of two constructs are empirically distinct (Bagozzi et al. 1991). To demonstrate adequate discriminant validity of the constructs, the square root of the average variance extracted for each construct should be greater than the correlations between that construct and all other constructs (Fornell and Larcker 1981). Table 6 presents the correlation matrix of the constructs and the square roots of the average variance extracted. The results suggest an adequate level of discriminant validity of the measurements.

Table 6. Reliability and Discriminant Validity

	CR	AVE	POE	COE	JC	MA	INT	WE	CB
POE	0.914	0.640	***0.800***						
COE	0.908	0.665	0.504	***0.815***					
JC	0.893	0.677	0.405	0.535	***0.823***				
MA	0.897	0.685	0.490	0.629	0.600	***0.828***			
INT	0.934	0.826	0.364	0.276	0.245	0.211	***0.909***		
WE	0.950	0.825	0.502	0.561	0.537	0.595	0.416	***0.908***	
CB	0.945	0.896	0.160	0.163	0.233	0.281	-0.039	0.315	***0.947***

*Diagonal elements are square roots of the AVE

Correlations between the independent variables greater than 0.6 suggest that multicollinearity may be a problem (Grewal et al. 2004). The common rule of thumb for the absence of multicollinearity is that Variance Inflation Factors (VIF) of all independent variables are lower than 10 and Tolerance value are larger than 0.1 (Mason and Perreault 1991). Given that some correlations (e.g., a correlation of 0.629 between COE and MA) in Table 6 exceeded the 0.60 criteria, we also checked for multicollinearity. The results indicated that the VIF values range from 1.210 to 2.055, and the Tolerance values range from 0.487 to 0.827, suggesting multicollinearity is not a problem for the regression results. In addition, to assess the extent of common method bias, we performed the Harman's single-factor test (Podsakoff et al. 2003). The results revealed that there are seven components with eigenvalues greater than 1.0 and no single factor explained most of the variance, indicating the common method bias is not a serious threat in this study.

Structural Model

We estimated the full model, the theoretical model and the control model to assess the true impact of the theoretical variables. Except for constructs in the theoretical model, three control variables (education level, experience with Internet and experience with WikiProject) are also included in the full model. Table 7 and Figure 2 present the results of the PLS analysis. As shown in Table 7, a comparison between the full model and the theoretical model reveals that the full model only explains an incremental variance of 1.2%. However, the incremental variance by comparing the full model and the control model reaches 12.3%. These results suggest that the theoretical model explains a greater proportion of the variance in knowledge contribution behavior in WikiProjects.

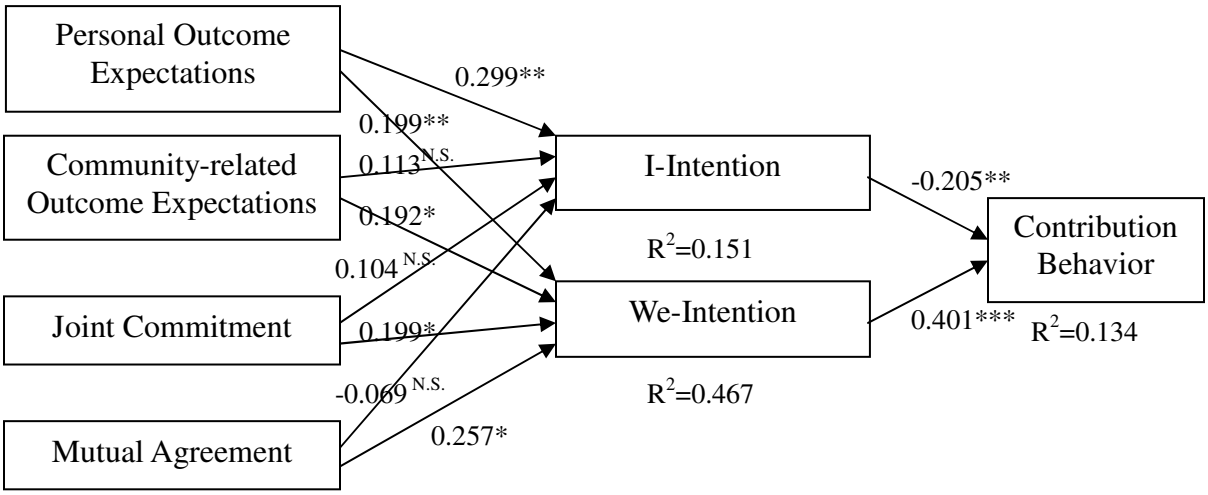
Table 7. Results of PLS Analysis

Constructs	**Path Coefficients**		
	Full Model	**Theoretical Model**	**Control Model**
I-Intention	-0.185**	-0.205**	
We-Intention	0.398***	0.401***	
Education Level	0.057 $^{N.S.}$		0.063 $^{N.S.}$
Experience with Internet	-0.062 $^{N.S.}$		-0.095 $^{N.S.}$
Experience with WikiProject	-0.086 $^{N.S.}$		-0.125 $^{N.S.}$
Variance Explained in Behavior (R^2)	14.6%	13.4%	2.3%

$^{N.S.}$ non-significant, *p<0.05, **p<0.01, ***p<0.001

The results of the PLS analysis for theoretical model are depicted in Figure 2, which presents the overall explanatory power and the estimated path coefficients (all significant paths are indicated with asterisks). Test of significance of all paths were performed using the bootstrap resampling procedure. The model accounts for 13.4% of the variance in contribution behavior, 15.1% of the variance in I-intention and 46.7% of the variance in we-intention. All structural paths that lead to we-intention are found statistically significant. Mutual agreement has the strongest impact on

we-intention, with a path coefficient at 0.257, followed by joint commitment, personal outcome expectations and community-related outcome expectations, with path coefficients at 0.199, 0.199 and 0.192 respectively. Personal outcome expectations posit a significant effect on I-intention to contribute, with path coefficient at 0.299. However, community-related outcome expectations, joint commitment and mutual agreement do not exert any statistically significant effects on I-intention. We-intention has the largest effect on contribution behavior, with a path coefficient at 0.401. Contrary to our expectation, I-intention exerts a statistically significant negative effect on contribution behavior in WikiProject.



N.S. non-significant, *p<0.05, **p<0.01, ***p<0.001

Figure 2. Results of PLS Analysis for Theoretical Model

Discussion

Open web-based encyclopedia provides free online communities for people with common interests and concerns to collaborate on encyclopedic work together. As an important part of online encyclopedia, WikiProject gathers a core group of active contributors and helps to produce excellent articles systematically. In this regard, cooperation and collaboration play important roles in determining the success of WikiProject in particular, and open web-based encyclopedia in general. Building on social cognitive theory and philosophical writing on collective intentionality, this study aims to examine the possible antecedents and consequences of I-intention and we-intention to contribute. This section first discusses the key findings, and then addresses the limitations of this study. This is followed by a discussion of the implications for both research and practice.

Discussion of Key Findings

The research model introduces the concept of we-intention into knowledge management research. The measurement model is successfully confirmed with adequate convergent and discriminant validity for all the measures. The structural model explains 46.7% of the variance in we-intention. In addition, compared to the traditional I-intention, we-intention explains a larger variance in collective contribution behavior. The empirical results support most of the hypotheses proposed in the research model. Personal outcome expectations are found to be important predictors of the two kinds of intention, but have a stronger impact on I-intention. This is consistent with prior findings derived from social cognitive theory. Joint commitment and mutual agreement are the two most important predictors of we-intention. This finding echoes with previous philosophical studies demonstrating that we-intention is formed by "commitment of an individual to participate in joint action, and involves an implicit or explicit agreement between the participants to engage in that joint action" (Tuomela 1995). However, contrary to our hypothesis, community-related outcome expectations do not have any significant impacts on I-intention. As suggested by an anonymous reviewer, this may be due to the fact that community-related outcome expectations are group-referent characteristics, and in this sense, people concerned more about community outcomes will be more likely to act as a group. Another interesting finding is that I-intention exerts a statistically significant negative effect on contribution

behavior in WikiProjects. One possible explanation is that people who display high individual intention may be more concerned about contribution itself rather than contributing to WikiProject as a cohesive group. Therefore, they may actively contribute to the wiki community as a whole, and this will reduce the likelihood to contribute in a specific WikiProject. On the other hand, as we discussed before, I-intention was measured in a way that seems against collective behavior (e.g., Even if other group members in WikiProject do not contribute, I still intend to contribute my knowledge to WikiProject). This also may be the reason why I-intention is negatively related to contribution behavior in WikiProjects, which to some extent embodies a collective sense of purpose.

Limitations

Before discussing the implications, we first address the limitations of this study in this section. First of all, this study was conducted in wiki communities in Mainland China and therefore generalization of the findings should be made with caution. Prior studies have indicated that culture may play an important role in we-intention formation (Bagozzi and Lee 2002). In an individualistic culture, people are supposed to make a decision based on what the individual thinks is the best and place the individual before the community, whereas in a collective culture, people tend to be more cooperative and are socialized to think in term of the group (Hofstede and Bond 1984). Obviously, this study was conducted in a collective culture and future cross-cultural study thus is highly recommended on this issue. Second, the research model explains only 15.1% of the variance in I-intention and 13.4% of the variance in contribution behavior in WikiProject. This suggests that some important variables may be omitted from the research model. Through a review of the literature, we believe that personal characteristics such as interaction propensity (Wiertz and de Ruyter 2007) and technical attributes such as system usability (Lee et al. 2006) may provide additional explanatory power to the model. In addition, since our respondents are these who have participated in WikiProjects before, knowledge contribution may take on a more habitual nature. In this regard, habit thus moderates the impacts of intention on actual behavior (Limayem et al. 2007). Future research should extend this line of research to investigate the role of habit, especially habit of collaboration, in we-intention models. Third, we have used subjective measures of contribution behavior in the current study. This is because the objective measures such as records of created content by each participant were not practical in this study. There are many WikiProjects and each WikiProject has many articles, therefore, it is hard to decide if an individual's contribution is included in one of the WikiProject through his/her objective contribution logs. Prior studies have also suggested that self-reported measures are appropriate as relative measures of actual behavior (Davis et al. 1989).

Implications for Research

This study contributes to existing knowledge management research in two important ways. First, this study explores knowledge contribution in Web 2.0 phenomenon by adopting the concept of we-intention. Today, the generation of collaborative online content is so popular and successful in almost every are of our life. It is thus necessary and desirable to understand the underlying motivations of contributors in the Web 2.0 era. In addition, the collaborative processes involved in online content creation also requires a new way of thinking to examine contribution intentions and behaviors. In this regard, we-intention investigated in the current study provides an opportunity for future research to explore this issue. The empirical results of this study also indicated that we-intention exerts a greater effect on actual contribution behavior than I-intention to contribute. This further justifies the necessity of incorporating we-intention in future intention-based models, especially when investigating group behaviors in the Web 2.0 context. Based on the findings of this study, we believe that I-intention and we-intention may function differently. For example, I-intention may be a more useful concept in explaining individual behavior, whereas we-intention is more suitable for intentional social action where two or more people are involved in decision making processes. Furthermore, in the context of online collaborations such as WikiProjects where there is no explicit *a priori* agreement on collaboration, even though the focal action is at group level (intentional social action), the proper unit of analysis is at the individual level (i.e. individual perception of group action). This is often an issue arousing much confusion in the past, as it was often thought that for group level study the unit of analysis should be at the group level too.

Second, this study draws on philosophical writing on intentionality to develop our research model. In particular, two salient antecedents of we-intention – joint commitment and mutual agreement – have been identified and empirically examined. The two factors well capture the collective perception among group members and provide the basis for the development of we-intention. The results indicated that they were significantly related to we-intention, but not I-intention. As far as we know, this is the first attempt to explore the unique antecedents of we-intention. The current

study thus is expected to enrich the limited amount of investigation on we-intention and provides a starting point for exploring factors contributing to the development of we-intention.

Implications for Practice

This study also provides important insights and practical strategies to practitioners who are interested in knowledge management issues. In the era of Web 2.0, the emerging technologies, such as wiki, greatly leverage the wisdom of crowds in creating collaborative online content and facilitate group work. According to the findings of this study, outcome expectations are the major concerns for people to contribute. Therefore, it is necessary to convince the potential contributors that their contribution behavior will yield substantial benefits to both individuals and community. For example, selective incentives should be provided to active contributors. This will encourage participation and attract more volunteers into encyclopedic work. In addition, community managers should develop long-term strategies regarding the goal and vision of the community, and inform participants that their contribution will help the community to achieve its goal. Once people perceive these future possible benefits, they will be more likely to contribute both individually and collectively.

Joint commitment and mutual agreement among group members are more important for collaborative team working with a common goal. Team managers thus should help participants to develop a joint commitment to contribution. For example, the working team should adhere to schedules of project completion and make the schedules explicit. In this situation, each member will know not only he/she is committed to the action, but all participants are jointly committed to the group activity. People thus have the right to claim each other's contribution, and at the same time, each member is also under an obligation to contribute to meet the group schedule. Mutual agreement among all participants is another important consideration for team managers. Some recommendations include encouraging open discussion of task-related issues and letting everyone participate in the discussion, permitting team members to choose preferred activities, and seeking the schedule with minimized counterviews. Finally, since I-intention and we-intention may be stimulated by different motivational factors producing different behavioral outcomes, managers should give priority to members' motivational incentives accordingly with the type of intended behavioral outcome in mind.

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