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Harnessing collective intelligence of Web 2.0: group adoption and use of Internet-based collaboration technologies

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Abstract
Along with the advent of Web 2.0, mass collaboration is of paramount importance in knowledge exploration and diffusion. However, the extent to which Internet-based collaboration technologies can be used to develop new knowledge and to leverage the wisdom of crowds heavily depends on the collective willingness to adopt such tools together. In this study, the adoption and use of instant messaging has been conceptualized as a group-referent intentional social action. The concept of 'we-intention', which refers to one's perception of the group acting as a unit, is the focus of our interest. The cognitive, affective and social dimensions that contribute to 'we-intention' to adopt and use instant messaging were investigated. A survey was conducted and the findings provided empirical evidence supporting the idea that cognitive, affective and social factors jointly lead to the development of we-intention. This study is expected to provide some useful insights to both researchers and practitioners.
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Introduction

Today, the rapid growth of Web 2.0 and its emphasis on mass collaboration have dramatically increased the efficiency of knowledge management and collaborative work. Collective intelligence, which refers to the shared knowledge that emerges from the collaboration of a group, thus can be leveraged through combining expertise of virtual community members. It is believed that the cognitive power of the crowds in the Web 2.0 era would largely facilitate problem solving, reasoning, brainstorming, prediction, reflection and imagination. Mass collaboration in this regard is viewed as the largest impact that social computing has on the Internet community thus far. To achieve the benefits of Web 2.0, the adoption and use of such technologies provide the necessary prerequisite for effective knowledge management. There are many examples of Web 2.0 tools, including a wide range of Internet-based collaboration technologies such as instant messaging, weblogs, wikis, podcasting, social networking services, etc. As a widespread platform, instant messaging greatly unleashes the power of 'us' and allows knowledge management among self-organized virtual communities (Schwartz, 2007). In particular, with its huge user base, instant messaging makes it possible for people to collaborate on various topics and further develop knowledge through effective collaboration. It

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supports real-time multi-user communication where participants can freely express thoughts, ideas and feelings, and get the replies from their peers immediately. This will promote effective and productive discussions on activities such as problem solving, ideas generation and cooperative learning. Besides, instant messaging offers many useful functions such as instant messaging group, messaging conferencing, application sharing and white boarding, which help people collaborate on any topic of common interest.

In the era of Web 2.0 and with the rise of online mass collaboration, social action exerts its importance in different situations. Different from the individual action, social behaviour is often viewed as a *mutually interdependent effort* in which the goal is to benefit all participants (Li *et al*, 2005; Bagozzi, 2007). In this regard, decision making involves joint and shared processes among a group of participants (Bagozzi, 2007), and thus requires different conceptual schemes in understanding such actions (Bagozzi & Dholakia, 2002). From a practical point of view, the necessity of extending the idea of action beyond the traditional concept of individual intention lies in the fact that the success of collaborative technologies requires simultaneous usage behaviour. People will take other users' future actions into account when they decide to collaborate through this technology, whereas the individual intention approach only considers one's own intention to act or not. With this point of view, the concept of we-intention, which refers to one's perception of the group acting as a unit, may be a relevant and appropriate construct in understanding behaviours in Web 2.0.

Although prior research has paid much attention to the adoption and use of instant messaging in team collaboration, most of them followed the individual intention (I-intention) approach (Li *et al*, 2005, 2010; Van Slyke *et al*, 2007). In fact, we-intention and I-intention may co-exist in some specific contexts, depending on the extent to which one can act individually or collectively to achieve his/her own goals (Shen *et al*, 2010). Since it is obvious that the use of instant messaging definitely cannot be performed by a person individually, individual intention thus may not provide enough unique insights. In the current study, the use of instant messaging is conceptualized and investigated as an act of social behaviour, and we-intention is the focus of our interest. The purpose of this study is to identify the key antecedents of we-intention to use instant messaging in knowledge management and collaboration.

Prior studies have adopted different theoretical perspectives to understand system usage intention and the identified factors can be basically aggregated into three categories, including cognitive, affective and social impact (Bagozzi & Dholakia, 2006). Cognitive dimension focuses on advantages and disadvantages resulting from system usage, whereas affective dimension relates to the emotions and feelings engendered by such behaviour. Social dimension, on the other hand, describes the social processes involved in system usage behaviour. With insights obtained from existing philosophical writing on collective intentionality (Tuomela, 1995), social psychological research on theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), social identity theory (Ellemers *et al*, 1999), and goal-directed anticipated emotions (Bagozzi *et al*, 1998), as well as mass communication research regarding media use (Flanagin, 2005), a research framework is developed and empirically tested in the current study.

The remainder of this paper is organized as follows. In the next section, the theoretical background of this study is reviewed. The research model and hypotheses are provided in the section after that. The research method and the results are reported in the two subsequent sections, respectively. This paper concludes with implications for both research and practice.

Theoretical background

In this section, the theoretical foundation of this study is presented. Specifically, a review of the concept of 'we-intention' is first conducted. This is followed by a discussion of TRA, social identity theory, goal-directed anticipated emotions, and the uses and gratifications paradigm (U&G).

We-intention

Scholars in philosophy have long been scrutinizing the concept of 'we-intention'. They examined the collective notion of behavioural intention from the conceptual and logical aspects (Tuomela, 1995; Bratman, 1997) and identified some distinct features of we-intention. One important feature of we-intention is the presence of collective commitment in joint cooperative action. If group members are collectively committed to performing an action, there will be publicly existing mutual interdependent promises among all the participants and the promise involves putting oneself under an obligation to act, therefore the participants are socially committed to each other to perform their parts of the collective action. Another important feature of we-intention is that the joint action opportunities should be obtained with some non-zero probability. In this sense, the group member believes not only that he/she performs his/her part of the group action, but also with some probabilities that other members in this group will perform the activity and achieve the common goal together (Tuomela, 2000). Therefore, we-intention can be considered as one's perception of the group acting as a coordinated unit where members in the group collectively accept the action and commit themselves to performing this behaviour. Prior conceptual studies further emphasized that the beliefs for we-intention are purely subjective (Tuomela, 1995), indicating that a member can be the only agent in the group with we-intention. In this regard, we-intention is often viewed and measured as an individual's subjective perception regarding the group behaviour (Bagozzi & Dholakia, 2006).

While the collective notion of behavioural intention has attracted much attention in philosophy, we-intention also has been empirically studied in other related areas. Major works on we-intention have been conducted in the fields of computer science (Balzer & Tuomela, 2003), social psychology (Bagozzi & Lee, 2002), and marketing and consumer behaviour (Bagozzi & Dholakia, 2002, 2006). With the proliferation and success of social computing, the individual intention approach is greatly challenged by its appropriateness in examining social behaviour created by new phenomena. In this sense, the inclusion of 'we-intention' in this study provides us with an additional explanatory power for understanding knowledge management and mass collaboration with social computing.

Theory of reasoned action

TRA has been widely used by IS researchers to explain system adoption and usage behaviour (Davis *et al*, 1989; Venkatesh *et al*, 2003). According to the TRA (Fishbein & Ajzen, 1975), an individual's behaviour is affected by his/her behavioural intention, which, in turn, is predicted by attitude toward the behaviour and subjective norm surrounding the performance of the behaviour. Attitude toward the behaviour is defined as a person's 'general feeling of favourableness or un-favourableness for that behaviour', and subjective norm is a person's 'perception that most people who are important to him think he should or should not perform the behaviour in question' (Ajzen & Fishbein, 1980). This theory previously has been used to understand knowledge sharing within social networks (Chow & Chan, 2008) and through social media, such as blogs (Hsu & Lin, 2008). In this regard, it is a solid theoretical base that can be adapted to examine knowledge management and collective action with Web 2.0 techniques. In particular, the TRA is extended to the group context in this study to better understand the 'mutual, shared, or in some other way joint processes' in decision making (Bagozzi, 2007), and individual intention is replaced by the concept of 'we-intention' accordingly. This approach is also consistent with prior studies that adopted the TRA in investigating intentional social actions (Bagozzi & Dholakia, 2006; Shen *et al*, 2010).

Although the TRA has been extensively employed to explain a wide range of behaviours, the effect of subjective norm on behavioural intention is controversial. Several studies have argued that subjective norm functions only under conditions of mandatory use and for users with limited experience (Karahanna *et al*, 1999; Venkatesh *et al*, 2003). Since the use of instant messaging is primarily voluntary, the social identity theory is used to capture the underlying social influence process in the current study. In addition, attitude in the TRA was also often criticized for its heavy emphasis on the cognitive consideration (French *et al*, 2005) and the relationship between attitude and intention, as both measured and modelled, does not reflect the affective aspect of making a decision. As a response to this deficiency, an alternative approach used by scholars in social psychology is to include measures of anticipated emotions, which capture the affective aspect of attitude, to improve the explained variance of behavioural intention (Bagozzi *et al*, 1998; Bagozzi & Dholakia, 2006). Following this line of research, the effects of anticipated emotions, along with the commonly used cognitive attitude, are examined in the current study.

Social identity theory

Social identity theory, developed by Tajfel & Turner (1979) was originally used to examine the psychological basis of inter-group discrimination. The core assumption behind social identity theory is that a person thinks, feels and acts on the basis of a 'group level of self' (as a member of the group) instead of a 'personal self' (Turner, 1987). This assumption echoes with the theory of social action in that people will perceive themselves in terms of 'we' rather than 'I' (Bagozzi & Dholakia, 2002). As we discussed above, we-intention captures the social category to which a person belongs, and the collective intention in relation to this plural target (Bagozzi & Lee, 2002). In this regard, social identity theory may be of great value in explaining the social influence process that leads to the development of we-intention.

Tajfel (1978) has asserted that social identity is '… that part of an individual's self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership' (p. 63). Building on Tajfel's (1978) work, Ellemers *et al* (1999) suggested that social identity involves three related but distinct aspects, including 'a cognitive component (a cognitive awareness of one's membership in a social group – self-categorization), an evaluative component (a positive or negative value connotation attached to this group membership – group self-esteem), and an emotional component (a sense of emotional involvement with the group – affective commitment)' (p. 372).

Goal-directed anticipated emotions

Anticipated emotions can be defined as affective responses where individuals imagine the emotional consequences of both goal achievement and goal failure before deciding to act (Bagozzi *et al*, 1998). The rationale for the effects of anticipated emotions is based on the argument that people will take into account the emotional consequence, along with the instrumental consequence reflected by cognitive attitude, before they decide to act or not in goal-directed situations. Because anticipated emotions are concerned with future prospects, the uncertainty of goal performance in future leads to both positive and negative anticipated emotions simultaneously. In this regard, anticipated emotions will influence behavioural intention through increasing the likelihood of experiencing positive emotions and reducing the likelihood of experiencing negative emotions. In the current study, anticipated emotions are used to complement the limitations of the TRA, and reflect the affective aspect of attitude. In some prior studies, both

positive and negative anticipated emotions are found to be significant factors in determining we-intention to participate in virtual communities (Bagozzi & Dholakia, 2002, 2006).

Uses and gratifications paradigm

U&G has its foundation in mass communication research and is considered as an influential approach to investigate users' motivations for media use (Blumler & Katz, 1974). The general idea of this paradigm is that users are goal-directed in their behaviour and actively use the media to gratify their social or psychological needs. Over the years, the U&G paradigm has been applied to understand the gratifications sought by users on a variety of media, and recently this approach continues to include studies of new media, including Internet (Stafford *et al*, 2004), ICQ (Leung, 2001), user-generated online content (Leung, 2009), virtual community (Cheung & Lee, 2009) and so on. This theory also showed its importance in explaining intentional social actions. For example, Dholakia *et al* (2004) employed the U&G paradigm to examine virtual community participations. The results indicated that purposive value and social benefits were the key drivers of participation in network-based and small-group-based virtual communities, respectively.

The U&G paradigm also has been used to investigate gratifications from instant messaging, and the results showed that gratifications fulfilled by instant messaging include social entertainment, task accomplishment, social attention and meeting new people (Flanagin, 2005). Social entertainment captures the gratifications of sociability and enjoyment. It refers to sociability gratification and fun received from interacting with others. Task accomplishment is the gratification derived from accomplishing special tasks, such as solving problems, making decision, etc. Social attention represents the benefits derived from maintaining a relationship with others. Meeting new people relates to gratification derived from talking to people whom they do not know before.

Research model and hypotheses

The research model, as shown in Figure 1, is based on the TRA and incorporates the insights from several disciplines. In particular, the cognitive, affective and social determinants of 'we-intention' to use instant messaging are investigated and the roles of user gratifications are examined. The constructs and their relationships are discussed in detail in the following sections.

The roles of attitude and anticipated emotions

According to the TRA, attitude toward the group use of instant messaging is viewed as influencing usage we-intention through an in-depth reflection on the advantages and disadvantages of the adoption behaviour. Thus the first hypothesis is:

H1: *Attitude toward the group use of instant messaging will have a positive impact on usage we-intention.*

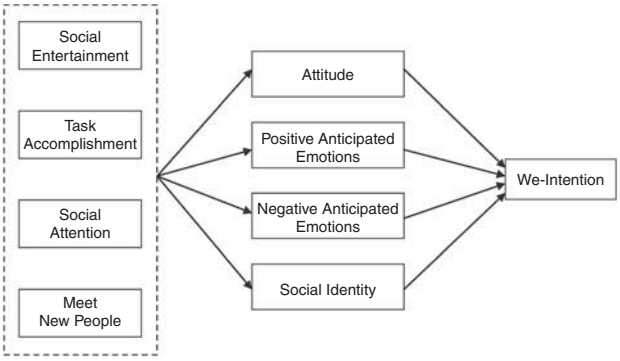

Figure 1 Research model.

Since the TRA mainly focuses on the cognitive consideration involved in the decision making processes, anticipated emotions are adopted in this study to investigate the affective aspects in making a decision to use instant messaging in mass collaboration (Bagozzi *et al*, 1998). Anticipation of the emotional consequences accruing from successful usage behaviour leads to positive anticipated emotions, whereas anticipation of the emotional consequences accruing from *being unable to use* the system leads to negative anticipated emotions. Therefore, if people anticipate positive emotions toward the future usage behaviour, they will be more likely to be motivated to use instant messaging with others to experience such positive emotions, whereas if people anticipate negative emotions from being unable to use instant messaging, they will try to adopt and use instant messaging together in order to avoid the possible negative emotions that may be caused by being unable to use. On the basis of the discussion above, both positive and negative anticipated emotions should have positive impacts on an individual's we-intention to use instant messaging.

H2: *Positive anticipated emotions from being able to use instant messaging will have a positive impact on usage we-intention.*

H3: *Negative anticipated emotions from being unable to use instant messaging will have a positive impact on usage we-intention.*

The role of social identity

Social identity theory recently has been widely used to explain how virtual community members develop we-intentions to participate in a digital environment (Dholakia *et al*, 2004; Bagozzi & Dholakia, 2006). The underlying rationale is that social identity actuates a particular behaviour for the benefits of all participants. Because of identification, people categorize themselves as members of the community and collectively develop participation we-intentions to reinforce the self-enhancements that are perceived as the consequences of group memberships. In our current study, social identity arises

through frequent interaction with other participants and will promote the collective use of instant messaging because people strive to strengthen a positive self-enhancement and to maintain a satisfying self-defining relationship with other participants (Bagozzi & Dholakia, 2006). In this regard, social identity is expected to have a direct positive effect on we-intention to use instant messaging in mass collaboration.

H4: *Social identity with the collaborative group will have a positive impact on usage we-intention.*

The role of gratifications

To better understand which needs are being gratified with the use of instant messaging, the four types of gratifications are integrated into our research model. Previous studies have found that the gratification of one's needs influences his or her attitude toward the media use. For example, Rubin (1986) proposed that attitude toward the use of a medium varies among users and is affected by the degree to which users' needs are satisfied. Ko (2000) further claimed that gratifications are significant predictors of attitude toward the use of Internet. In this study, it is clear that if one's social or psychological needs have been fully satisfied with the group use of instant messaging, he/she will be more likely to develop a positive attitude toward the usage behaviour. On the basis of the discussion above, we assume that people with higher levels of needs gratification should have a more positive attitude toward using instant messaging in mass collaboration. Therefore,

H5: *User gratification (i.e., social entertainment, task accomplishment, social attention and meeting new people) arising from using instant messaging together will have a positive impact on attitude toward the group use of instant messaging.*

Anticipated emotion in this study reflects the expected affective responses toward being able or unable to use instant messaging in mass collaboration, and it represents the affective aspects of attitude. Similar to the above discussion regarding the effects of gratifications on the cognitive aspects of attitude, in the current research context, if an individual feels satisfied with the use of instant messaging, he/she will be more likely to develop positive emotions (e.g., excited, delighted, happy, etc.) about being able to use instant messaging and negative emotions (e.g., angry, frustrated, guilty, etc.) toward being unable to use it with others. In this regard, people with high levels of needs gratification should have higher levels of both positive and negative anticipated emotions. On the basis of the discussion above,

H6: *User gratification (i.e., social entertainment, task accomplishment, social attention and meeting new people) arising from using instant messaging together will have a positive impact on positive anticipated emotions from being able to use instant messaging.*

H7: *User gratification (i.e., social entertainment, task accomplishment, social attention and meeting new people) arising from using instant messaging together will have a positive impact on negative anticipated emotions from being unable to use instant messaging.*

Social identity theorists have demonstrated that identification with a social group is initially derived from its functionality, that is, the group can fulfill some important needs of its members (Hogg & Abrams, 1988). This statement was further confirmed by Dholakia *et al* (2004) who have found that both purposive and entertainment values exert significant impacts on identification with virtual communities. In the current study, if group members have an explicit understanding of the significant benefits attached to the membership and find that their needs can be well gratified with the use of instant messaging, they will further be motivated to have a higher identification with the collaborative group. Therefore,

H8: *User gratification (i.e., social entertainment, task accomplishment, social attention and meeting new people) arising from using instant messaging together will have a positive impact on social identity with the collaborative group.*

Research method

The research model was empirically examined in a sample of university students who use QQ instant messaging in group collaboration (e.g., discuss group project or class assignment). QQ is the most popular instant messaging platform in Mainland China and estimated to have over 674.3 million active accounts at the end of March 2011. More important, it provides applications like QQ Groups (http://group.qq.com) for QQ users who have common interests or experiences to discuss and collaborate on various issues. Currently, there are more than 50 million QQ Groups in Mainland China. In QQ Groups, any member can initiate a particular topic or a certain group of topics for discussion, and at the same time, other members can participate in the mass collaboration effort to further capture the collective intelligence. In this way, people can make good use of the knowledge available in the QQ Groups simply through sending an instant message to the group. In this study, the unit of analysis is university student who has used QQ Group in knowledge exchange and collaboration. Details about the measures, data collection method and sample characteristics are discussed in the sections below.

Measures

All the measures in this study are multi-item scales adapted from prior research (as shown in the Appendix). Minor changes in the wordings were made so as to fit the current investigation context. A seven-point Likert scale was employed for all items in the questionnaire except for attitude, which is measured on a seven-point semantic

scale. Since this study was conducted in Mainland China, backward translation was used before data collection so as to ensure consistency between the Chinese version and the original English version of the questionnaire.

Data collection

Two different survey methods, a paper-and-pencil survey and an online survey, were used during the data collection period. This mixed mode approach mitigates the coverage errors or other biases resulting from data collection method (Wallace *et al*, 2004). A group of business students in a local university in Mainland China were invited to participate in the paper-and-pencil survey. Students from six randomly selected classes were encouraged to complete the questionnaire. Before they filled in the questionnaire, the purpose and the scenario of the survey were first instructed. A self-administrative online questionnaire was posted in the Bulletin Board System of this university simultaneously. Participation in this study was voluntary yet motivated by a lucky draw among the successful respondents. In addition, a screening question was adopted to identify respondents who have used QQ Group before.

Sample characteristics

For the paper-and-pencil survey, a total of 301 usable questionnaires were collected and for the online survey, a total of 181 usable questionnaires were collected. Since a comparative analysis of the two samples revealed no significant difference in the composition of respondents, the two data sets were combined as a total for further analysis. The final sample thus consists of a total of 482 respondents, out of which 313 were male (64.9%) and 169 were female (35.1%). A large majority (60.6%) of the respondents were aged between 21 and 25. The average usage experience with QQ was 5.12 years and the average time spent on QQ everyday reached 3.43 h.

Results

PLS-Graph (Partial Least Squares) version 3.00 was used to test the proposed research model. The PLS procedure is a second-generation multivariate technique that can assess the measurement model and the structural model simultaneously in one operation. Following the two-step analytical procedures (Hair *et al*, 2005), the measurement model was first examined and then the structural model was assessed.

Measurement model

The convergent validity was assessed by the composite reliability and the average variance extracted. Composite reliability is 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, 1987). As shown in Table 1, all the measures exceed the recommended thresholds, with composite reliability ranging from 0.876 to 0.962 and average variance extracted ranging from 0.623 to 0.827.

Discriminant validity indicates the extent to which a given construct differs from other constructs. To demonstrate the 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, 1987). Table 1 shows the correlation matrix of the constructs and the square roots of the average variance extracted, which suggests an adequate level of discriminant validity of the measurements.

Structural model

The results of the analysis are depicted in Table 2. Tests of significance of all paths were performed using the bootstrap re-sampling procedure. The model accounts for 41.1% of the variance in we-intention, 24.1% of the variance in attitude, 42.2% of the variance in positive anticipated emotions, 13.4% of the variance in negative anticipated emotions and 31.1% of the variance in social identity.

Table 1 Correlation matrix of the constructs

	CR	*AVE*	*SE*	*TA*	*SA*	*MNP*	*ATT*	*PAE*	*NAE*	*SI*	*WE*
SE	0.876	0.702	**0.838**								
TA	0.896	0.683	0.671	**0.826**							
SA	0.901	0.819	0.404	0.467	**0.905**						
MNP	0.899	0.817	0.252	0.344	0.514	**0.904**					
ATT	0.893	0.677	0.465	0.427	0.244	0.164	**0.823**				
PAE	0.932	0.661	0.600	0.569	0.394	0.257	0.489	**0.813**			
NAE	0.962	0.719	0.099	0.262	0.291	0.262	0.101	0.251	**0.848**		
SI	0.908	0.623	0.505	0.506	0.314	0.165	0.509	0.599	0.099	**0.789**	
WE	0.905	0.827	0.572	0.549	0.373	0.308	0.449	0.57	0.252	0.524	**0.909**

The bold-faced numbers in the diagonal row are square roots of average variance extracted.
Note: CR = Composite Reliability, AVE = Average Variance Extracted, SE = Social Entertainment, TA = Task Accomplishment, SA = Social Attention, MNP = Meeting New People, ATT = Attitude, PAE = Positive Anticipated Emotions, NAE = Negative Anticipated Emotions, SI = Social Identity, WE = We-intention.

Table 2 Results of PLS analysis

		Path Coefficients		*t-value*	*Hypothesis Support*
Usage We-intention					
H1:	Attitude	0.159***		3.914	Supported
H2:	Positive Anticipated Emotions	0.314***		5.762	Supported
H3:	Negative Anticipated Emotions	0.133***		3.702	Supported
H4:	Social Identity	0.242***		5.134	Supported
			$R^2 = 0.411$		
Attitude					
H5a:	Social Entertainment	0.322***		5.562	Supported
H5b:	Task Accomplishment	0.201***		4.212	Supported
H5c:	Social Attention	$0.018^{N.S.}$		0.361	Not supported
H5d:	Meet New People	$0.004^{N.S.}$		0.089	Not supported
			$R^2 = 0.241$		
Positive Anticipated Emotions					
H6a:	Social Entertainment	0.377***		6.574	Supported
H6b:	Task Accomplishment	0.258***		4.301	Supported
H6c:	Social Attention	0.114**		2.684	Supported
H6d:	Meet New People	$0.014^{N.S.}$		0.286	Not supported
			$R^2 = 0.422$		
Negative Anticipated Emotions					
H7a:	Social Entertainment	−0.174**		3.025	Not supported
H7b:	Task Accomplishment	0.252***		3.887	Supported
H7c:	Social Attention	0.178***		3.356	Supported
H7d:	Meet New People	0.127*		2.538	Supported
			$R^2 = 0.134$		
Social Identity					
H8a:	Social Entertainment	0.289***		4.788	Supported
H8b:	Task Accomplishment	0.289***		4.795	Supported
H8c:	Social Attention	0.090*		2.109	Supported
H8d:	Meet New People	$-0.053^{N.S.}$		0.991	Not supported
			$R^2 = 0.311$		

Note: *$P<0.05$; **$P<0.01$; ***$P<0.001$; N.S.: not significant.

All structural paths with direct impacts on we-intention are found statistically significant at the 0.001 level in our research model. The research findings of this study provide concrete empirical evidence that the cognitive (attitude), affective (positive and negative anticipated emotions) and social (social identity) dimensions all play important roles in explaining the group adoption and use of instant messaging. However, the four types of user gratification matter differently. Among the four gratifications, social entertainment and task accomplishment have statistically significant effects on attitude, whereas the other two gratifications (social attention and meet new people) do not have any impact on users' attitude. One possible explanation is that attitude represents an assessment of the advantages derived from the overall usage experience within the collaborative group. In this sense, gratifications of social entertainment and task accomplishment are more related to the benefits derived from the group, whereas the other two gratifications may focus more on the relationships with individual members (Cheung & Lee, 2009). Gratification from meeting new people is also insignificant in predicting positive anticipated emotions and social identity. This may be due to the fact that most respondents in this study are familiar with other group members. All the four gratifications have significant impacts on negative anticipated emotions. However, contrary to our expectation, gratification deriving from social entertainment exerts a significantly negative effect on negative anticipated emotions, with a path coefficient at –0.174. One possible reason behind this finding is that the gratifications of sociability and enjoyment also can be obtained from other channels, such as cell phone (Flanagin, 2005), therefore, people with high motivation in social entertainment may not feel any negative emotions at all if they are unable to use instant messaging with their peers. The results of this study also demonstrated that the gratifications of social entertainment, task accomplishment and social attention have strong and significant impacts on social identity with the collaborative group.

Discussion and conclusion

This study extends the TRA into an online collaborative environment with a particular emphasis on the affective and social determinants of 'we-intention'. The measurement model is confirmed with adequate convergent and discriminant validity of all the measures, and the structural model explains 41.1% of the variance in we-intention to use instant messaging in mass collaboration. The results support most of the proposed relationships in the research model. Discussion of the limitations of this study and the implications for both research and practice are presented in the following sections.

Limitations

Before highlighting the implications for research and practice, we first discuss the potential limitations that could be addressed in future investigation. First, the data were collected from a student sample and we-intention in this study is formed when students use instant messaging to discuss group projects or class assignment together. However, this type of usage behaviour may be different from the group adoption and use of instant messaging in business contexts. Although students are tomorrow's work force, generalization of the findings should be made with caution. Second, due to resources limitations, we did not collect actual usage data in the current study. The extent to which we-intention will predict actual behaviour definitely deserves more attention in future research. A longitudinal study capturing actual usage behaviour thus is highly recommended on this point. Third, this study was conducted in a collectivistic culture. Previous studies have found that culture exhibits a significant effect on information technology adoption and diffusion. It is thus important to recognize that group behaviour may be more likely to occur in a collectivistic culture than in an individualistic culture (Bagozzi & Lee, 2002). Therefore, cross-cultural studies examining this issue are clearly required in future research.

Implications for research

This study addresses an important area of research that has the potential to contribute significantly to the current understanding of the group adoption and use of social computing in knowledge management and mass collaboration. Collaboration enabled by social computing greatly unleashes the power of collective wisdom and changes the way people work and collaborate. In the current study, the use of instant messaging in mass collaboration is conceptualized and investigated as a group-referent intentional social action, and accordingly the concept of 'we-intention' is employed as the dependent variable in our research model. The concept of we-intention is relatively new in IS field and the underlying rationale of applying we-intention to social computing context is that people can actually use social media effectively only when a group of users mutually agree to adopt and use it together. Therefore, we-intention, with an eye on collective consciousness and simultaneous efforts, is a more appropriate and relevant conceptualization in assessing the group use of collaborative technologies than the traditional individual intention approach. This study thus provides an opportunity for future research to improve our understanding of social behaviours in the new era of Web 2.0.

In addition, this study has provided strong empirical evidence supporting the idea that cognitive, affective and social dimensions underpin the development of 'we-intention'. It also adds momentum to recent movements in the field calling for theoretical extension of attitudinal-behavioural-intention models beyond instrumental cognitive boundaries. The multidisciplinary approach of this study offers some new insights into the underlying mechanisms involved in intentional social behaviour. The empirical results of this study support most of the hypothesized relationships and the research model accounts for a significant proportion of the variance in usage we-intention, suggesting the potential feasibility of an integrated, multidisciplinary approach in investigating the group adoption and use of instant messaging in mass collaboration.

Implications for practice

This study is especially important for practice because the use of instant messaging in the workplace continues to grow at a steady pace. With the prevalence of instant messaging in organizations, managers are able to harness the collective wisdom of employees and find out the most effective solution to their problems. According to the results of this study, anticipated emotions and social identity are the two most important determinants of usage we-intention. Therefore, team managers could demonstrate some successful cases of instant messaging-based collaboration to employees in order to improve their positive feeling toward the use of instant messaging. Managers also should make good use of the special features of instant messaging, such as messaging conferencing, chat room and white boarding, to promote employees' identification with the collaborative group and to enhance the similarity among group members.

The inclusion of gratifications in this study also provides some valuable guidance to team managers. Social entertainment, task accomplishment and social attention are the three most important needs that users seek to gratify from their use of instant messaging. Therefore, managers should encourage a climate of using instant messaging for problem solving and decision making. Only when group members actively take part in debates or discussions through instant messaging, can the benefits of instant messaging be achieved. In addition to job-related topics, some interesting discussions can be initiated among group members in order to increase entertainment received from interacting with others. The updates of personal profiles also can be announced to each member timely so that people will feel directly concerned by the group.

Conclusion

In summary, this study provides an important and valuable insight into understanding system usage we-intention in knowledge management and mass collaboration. As communication is at the heart of knowledge transfer (Schwartz, 2007), with the advent and popularity of social computing, as well as the widespread use of instant messaging, the opportunity to collaborate on group-related task is greater than before, and mass collaboration in this regard helps to produce substantial benefits to the overall business. As a key concept in explaining the group adoption and use of instant messaging, 'we-intention' thus definitely should deserve more attention in future research. The cognitive, affective and social determinants of we-intention also shed different lights on the understanding of intentional social action in the social computing era.

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Appendix

Constructs and Measures (The numbers in the brackets are the loadings for each item)

Social Entertainment (SE)

How often do you use QQ Group to gratify the following needs? (seven-point 'never-frequently' scales)

SE1: To communicate easily (0.883)
SE2: To stay in touch (0.836)
SE3: To provide information (0.791)

Task Accomplishment (TA)

How often do you use QQ Group to gratify the following needs? (seven-point 'never-frequently' scales)

TA1: To solve problems (0.817)
TA2: To generate ideas (0.831)
TA3: To negotiate or bargain (0.839)
TA4: To make decisions (0.818)

Social Attention (SA)

How often do you use QQ Group to gratify the following needs? (seven-point 'never-frequently' scales)

SA1: To feel less lonely (0.914)
SA2: To feel important (0.896)

Meet New People (MNP)

How often do you use QQ Group to gratify the following needs? (seven-point 'never-frequently' scales)

MNP1: To talk to people I do not know before (0.916)
MNP2: To meet new people (0.892)

Attitude (ATT)

Using QQ Group in team collaboration would be: (seven-point semantic scales)

ATT1: foolish/wise (0.861)
ATT2: harmful/beneficial (0.847)
ATT3: bad/good (0.878)
ATT4: punishing/rewarding (0.693)

Positive Anticipated Emotions (PAE)

If I am able to use QQ Group in team collaboration, I will feel: (seven-point 'not at all-very much' scale)

PAE1: not at all excited/ excited very much (0.862)
PAE2: not at all delighted/delighted very much (0.874)
PAE3: not at all happy/happy very much (0.841)
PAE4: not at all glad/glad very much (0.825)
PAE5: not at all satisfied/satisfied very much (0.803)
PAE6: not at all proud/proud very much (0.738)
PAE7: not at all self-assured/self-assured very much (0.739)

Negative Anticipated Emotions (NAE)

If I am unable to use QQ Group in team collaboration, I will feel: (seven-point 'not at all-very much' scale)

NAE1: not at all angry/angry very much (0.804)
NAE2: not at all frustrated/frustrated very much (0.866)
NAE3: not at all guilty/guilty very much (0.810)
NAE4: not at all ashamed/ashamed very much (0.802)
NAE5: not at all sad/sad very much (0.881)
NAE6: not at all disappointed/disappointed very much (0.834)
NAE7: not at all depressed/depressed very much (0.887)
NAE8: not at all worried/worried very much (0.873)
NAE9: not at all uncomfortable/uncomfortable very much (0.866)
NAE10: not at all anxious/anxious very much (0.854)

Social Identity (SI)

SI1: How would you express the degree of overlapping between your own personal identity and the identity of the group that you collaborate with through QQ Group when you are actually part of the group and engaging in group activities? (seven-point 'far apart-complete overlap' scale) (0.655)
SI2: Please indicate to what degree your self-image overlaps with the identity of the group as you perceive it. (seven-point 'not at all-very much' scale) (0.779)
SI3: How attached are you to the group that you collaborate with through QQ Group? (seven-point 'not at all-very much' scale) (0.830)
SI4: How strong would you say your feelings of belongingness are toward the collaborative group? (seven-point 'not at all-very much' scale) (0.833)
SI5: I am a valuable member of the group. (seven-point 'does not describe me at all-describes me very well' scale) (0.806)
SI6: I am an important member of the group. (seven-point 'does not describe me at all-describes me very well' scale) (0.819)

We-Intention (WE)

WE1: I intend that our group use QQ Group in team collaboration together. (seven-point 'strongly disagree-strongly agree' scale) (0.914)
WE2: We intend to use QQ Group in team collaboration together. (seven-point 'strongly disagree-strongly agree' scale) (0.905)

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