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THE ROLE OF PERCEIVED CRITICAL MASS IN EXPLAINING WE-INTENTION TO USE INSTANT MESSAGING FOR TEAM COLLABORATION

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Abstract

Today, instant messaging has been becoming a major communication technology in business environment. One important causal factor related to the use of instant messaging is critical mass. Specifically, the use of instant messaging requires collective efforts and interdependence among two or more people, and thus is conceptualized as intentional social action in the current study. Drawing on prior studies of social influence and critical mass, we propose a research model and empirically evaluate it using survey data collected from 227 respondents. The results indicate that perceived critical mass impacts usage we-intention both directly and indirectly through attitude and social influence factors. We believe the findings of this study will provide important implications to both researchers and practitioners.

Keywords: We-Intention, Perceived Critical Mass, Instant Messaging, Theory of Reasoned Action, Social Influence

Introduction

With the rapid growth and expansion of Internet, instant messaging has been becoming a key business communication technology. The adoption of instant messaging in organizations makes collaborative team more efficient through reducing delays in decision-making and enabling rapid response to the dynamic and volatile business environment. A recent Forrest report indicated that instant messaging is the most valuable web 2.0 technology for enterprise [40]. Compared to the conventional business communication tools, such as email, instant messaging has several unique features that are especially suitable for team collaboration. For example, it can notify users when their buddies are online and available to receive messages, facilitate real-time online communication, allow users create a private chat room for group project discussion or even for desktop video-conferencing, permit team members to work on office software together, and enable quick transfer of files, documents, images, and the like.

A large number of Information Systems (IS) research has been devoted to investigating the adoption and diffusion of interactive communication technologies [23] [25] [26]. Communication technologies "require multiple users and cannot be used successfully by one person acting alone" [34]. It has two distinct characteristics: universal access and reciprocal interdependence. Universal access requires almost everyone agree to use the media on a regular basis and reciprocal interdependence indicates early and later adopters are mutually influenced [26]. It is the social processes surrounding the use of the technology that determine the communication patterns [25]. Lou et al. [23] and Li et al. [22] further demonstrated that communication technology is different from traditional information technology in that the former is designed for collaboration and cooperation, therefore the benefits of using a communication technology can be achieved only when the majority of the users accept and use the system. The interactive and interdependent nature of interactive communication technology raises several interesting issues. For example, does the collective acceptance of communication technology demand a re-conceptualization of employees' usage intention? What conditions under which communication technology become self-sustaining? Which processes of social influence may affect the use of communication media? With an attempt to address these questions, we regard the use of instant messaging as intentional social action in the current study and examine the impact of perceived critical mass on usage we-intention through a theoretically-derived research model.

The remainder of this study is organized as follows. We first review the theoretical background of this study in Section 2. We then present the research model and discuss the proposed hypotheses derived from the model in Section 3. We describe the research method and report the results of data analysis in Section 4 and 5 respectively. We finally discuss the research findings and the implications for both researchers and practitioners in Section 6.

Theoretical Background

In this section, prior studies on the use of instant

messaging in team collaboration are first discussed. The theoretical foundation of this study is then reviewed. Specifically, the concept of we-intention, theory of reasoned action, critical mass theory and Kelman's social influence framework are discussed.

Instant Messaging for Team Collaboration

Previous studies have demonstrated that instant messaging increase participation, cooperation, and collaboration among geographically dispersed co-workers [6]. For example, Nardi et al. [27] distinguished between the inter-action and outer-action processes in the use of instant messaging in the workplace. They found that people use instant messaging both for information exchange and for social connectedness. Isaacs et al. [19] further reported two distinct styles of instant messaging usage in the workplace. Heavy IM users mainly use it to work together, whereas light users mainly use it to coordinate. Herbsleb et al. [16] have found that the perception regarding the utility of instant messaging in the workplace depends on the users' views of the importance of information communication and the perceptions of the nature of cross-site communication issues. Quan-Haase et al. [30] later examined the use of instant messaging among knowledge workers in a high-tech firm and found that instant messaging creates higher connectivity and leads to a new form of collaboration. Similarly, Cho et al. [8] demonstrated that instant messaging improve employees' working relationships with co-workers both within and across organizational boundaries.

We-Intention

We-intention is often considered as the intention to participate in a group and perform a group activity in which the participants perceive themselves as members of the group (for a review, see [3]). There are several unique characteristics that distinguish we-intention from the traditional individual intention (I-intention) [36] [37]. First, the main target is different. For I-intention, the intended target is a singular subject, whereas for we-intention, the focus is plural target. It is a group of people instead of an individual that acts or experiences an event. Therefore, the behavior is perceived as a group-referent intentional social action. Second, there is a difference in goal achievement process. In the circumstance of we-intention, the intention content is collectively accepted by each participant who functions as a member of the group and accordingly, all participants have collective commitment and shared authority over the joint action. In contrast, a given behavior is privately accepted by an individual in the I-intention situation. Therefore, an individual may be privately committed to performing the behavior and have full control over

his/her own action. Third, there is a difference in reasons for acting. Participants with we-intention are motivated by group reasons such as community-oriented motivational factors, whereas individuals with I-intention are primarily motivated by personal reasons. In addition, another central difference between I-intention and we-intention lies in the satisfaction condition. The collectivity condition for the satisfaction of we-intention supposes that if the intention content is satisfying for one member of a group, it is satisfying for all the members in this group. In contrast, the intention content is just satisfying for an individual in the I-intention context.

We-intention has initially been concerned by philosophers [5] [36] [37], who primarily focused on conceptual and logical aspects. Only recently, some studies concentrated on the measurement and hypothesis testing concerns, and started to employ this concept to explain virtual community participation and communication technology adoption behavior [1] [7] [11] [32]. These empirical studies on we-intention have demonstrated that both individual reasons (e.g., attitude, perceived behavioral control, emotions, etc.) and social factors (e.g., group norms, social identity, social presence, etc.) are significant predictors of participation we-intention. The importance of we-intention in ensuring the success of a communication technology is underscored by the fact that people have to take into account others' responses to this use [6]. The use of a communication technology thus requires collective efforts and interdependence between two or more people [22]. In this sense, we-intention may be a more appropriate construct in investigating the collective acceptance of communication technology in the current study.

Theory of Reasoned Action

Scholars in Information Systems (IS) field have a long tradition of borrowing intention models from social psychology as a theoretical foundation for research on human behavior. Among these models, theory of reasoned action (TRA) [13] is one of the most often used theories in IS research and has been proven successful in predicting and explaining a wide range of behaviors [9] [38]. According to TRA, an individual's behavior is affected by behavioral intention, which in turn, is predicted by attitude toward the behavior and subjective norm surrounding the performance of the behavior.

Although TRA is useful in explaining information technology adoption and usage behavior, the effect of subjective norm on usage intention is controversial. Several studies have argued that subjective norm functions only under conditions of mandatory use and for users with limited experience [20] [38]. In our current investigation context, the

use of instant messaging in team collaboration is mostly voluntary. People often use public instant messaging services at work and therefore subjective norms may not be essential in predicting the acceptance and use of instant messaging. To better understand the acceptance of instant messaging, we take ideas from critical mass theory and Kelman's social influence framework to capture the underlying social processes.

Critical Mass Theory
Critical mass theory has been developed to predict the probability, extent and effectiveness of collective action. Critical mass was originally defined as "a small segment of the population that chooses to make big contributions to the collective action" [28]. It is assumed to provide the necessary conditions for reciprocal behavior to get started and become self-sustaining [26]. The concept of critical mass was later introduced into innovation diffusion research and was defined as "the point at which enough individuals have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining" [31]. Critical mass theory is particularly important in explaining the adoption and diffusion of communication technologies because the value of the technology increases with the number of its users [23]. Therefore, if there is a critical mass of users who communicate via the technology on a regular basis, the use of this technology will spread rapidly and users can communicate to others with the least efforts [6] [26] [33]. Although the actual critical mass is difficult to measure, an individual may have a perception of whether an innovation reaches the threshold of critical mass and such perception is termed "perceived critical mass" in prior studies [23].

Prior studies have extensively examined the role of perceived critical mass in behavioral intention to use instant messaging. For example, a case study investigating the use of instant messaging in organizations suggested that critical mass represents an important factor for instant messaging success in the workplace [6]. Ilie et al. [18] further demonstrated that perceived critical mass will influence intention to use instant messaging more strongly for men than for women. In addition to the direct effect on usage intention, perceived critical mass also affects intention to use instant messaging indirectly through users' perception concerning this innovation. For example, Li et al. [22] found that perceived critical mass influences behavioral intention to continue using instant messaging both directly and indirectly through perceived usefulness and perceived enjoyment. Slyke et al. [33] further demonstrated that perceived critical mass relates to instant messaging usage intentions both directly and indirectly through perceived innovation

characteristics.

Social Influence Framework
Previous studies have suggested that social influence is especially important in determining the successful adoption and use of communication technology [7] [32], especially "social influence in the form of coercion or collective adoption decision" is believed to be necessary for attracting the earliest users [26]. Social influence often consists of informational and normative influence [10] and operates through three different processes – compliance, internalization and identification [21]. Informational influence is often considered as an internalization process through which an individual accepts information obtained from others as evidence about reality. Normative influence is a combination of compliance and identification. Compliance occurs when an individual conforms to the expectations of significant others to receive support or avoid punishment. Identification occurs when an individual accepts the influence in order to establish and maintain a positive self-defining relationship with another person or a focal group [2] [17] [21].

Research Model and Hypotheses
The research model, as shown in Figure 1, is based on theory of reasoned action and incorporates perceived critical mass and social influence processes to explain users' we-intention to adopt instant messaging for team collaboration. To better determine the role of perceived critical mass in intentional social acceptance, we also propose that perceived critical mass impacts usage we-intention both directly and indirectly through attitude and social influence factors. The constructs and their relationships are discussed in detail in the following sections.
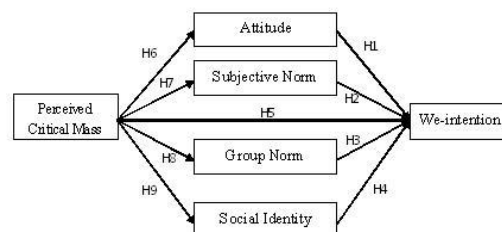

Figure 1. Research Model

The Role of Users' Attitude
As we noted early, the values of instant messaging can be achieved only when most of the peers agree to use it on a regular basis [26]. In this regard, instant messaging requires collective efforts and interdependence among all participants [22]. Therefore, we conceptualize the use of instant messaging as an intentional social action and replace individual intention with we-intention in the current

study. According to TRA, attitude reflects a person's consideration of the extent to which performing a behavior is advantageous or disadvantageous and it further leads to behavioral intention [13]. Consistent with this view, the first hypothesis is:

H1: Attitude toward the use of instant messaging will have a positive impact on we-intention to use instant messaging for team collaboration.

The Role of Social Influence

The social influence underlying the compliance process is represented by subjective norm in this study. As we discussed before, subjective norm functions only under conditions of mandatory use and for users with limited experience. In the current investigation context, people often use public instant messaging services for team collaboration and the usage behavior is mostly voluntary. Therefore,

H2: Subjective norm will NOT have any significant impact on we-intention to use instant messaging for team collaboration.

The internalization process is represented in the current study through the effect of group norm. Social influence underlying this process is captured by the congruence of the information obtained from others and one's own value system. In the current study, if users believe that they have similar goals or values with other participants, they will be more likely to develop a we-intention to use instant messaging together. Therefore,

H3: Group norm will have a positive impact on we-intention to use instant messaging for team collaboration.

The third social influence process is identification, which is characterized by social identity in this study. Identification refers to one's conception of self in terms of the relationship with a focal group. Social identity has been used to explain the development of participation we-intention in some prior studies [1] [11]. The rationale is that social identities "prescribe and instigate behaviors for the benefit of group members" [4]. In this study, social identity will induce group-oriented behaviors, such as using instant messaging for team collaboration, because users are motivated to distinguish their own group from out-groups. Therefore,

H4: Social identity will have a positive impact on we-intention to use instant messaging for team collaboration.

The Role of Perceived Critical Mass

In this study, perceived critical mass is defined as "the degree to which a person believes that most of his or her peers are using the system" [23, p. 95]. Lou et al. [23] have suggested that critical mass is the basis for sustained collective action. Without securing a critical mass of users, communication

technology cannot be successfully implemented due to a lack of active participants [24]. The direct effect of perceived critical mass on behavioral intention has been empirically examined and found to be significant in several studies (e.g., [22] [23] [33]). In the current study, if an individual believes that most of his or her peers are using instant messaging for collaborative work, he or she will be more likely to use instant messaging together with others. Therefore,

H5: Perceived critical mass will have a positive impact on we-intention to use instant messaging for team collaboration.

Perceived critical mass reflects an individual's perception of the number of current users [22] [23]. This perception can be developed through interaction with others [23] and people will develop their own attitudes toward the innovation via the perceived number of users [17]. In the current study, if people perceive that most of their peers are using instant messaging for team collaboration, they may have a favorable attitude toward the use of instant messaging. Therefore,

H6: Perceived critical mass will have a positive impact on attitude toward the use of instant messaging.

Prior studies have suggested that perceived critical mass affects the acceptance of communication technologies through both informational influence and normative influence [23]. Since the use of instant messaging is mostly voluntary, the usage behavior thus is unlikely to be rewarded or punished. Therefore, we believe that perceived critical mass will not significantly relate to subjective norm. In the current study, informational influence is reflected through internalization process (group norm) and normative influence is reflected through identification process (social identity) [17]. Group norm captures "an understanding of, and a commitment by, the individual member to a set of goals, values, beliefs, and conventions shared with other group members" [11, p. 245]. It is often considered as the most readily accessible or inferable group-related information. In this study, if there is a critical mass of users, potential adopters may gradually understand the group norm through direct and indirect interaction with previous adopters or announcement made about the use of instant messaging [11]. In addition, the information exchange and the perception that most of their peers are using instant messaging for team collaboration may lead the potential users to believe that this technology can meet their own goals [23]. The perceived overlap with the group norm will make the norm to be more influential [29]. Therefore,

H7: Perceived critical mass will NOT have any significant impact on subjective norm concerning the use of instant messaging for team collaboration.

H8: Perceived critical mass will have a positive impact on group norm regarding the use of instant messaging for team collaboration.

Social identity captures an individual's identification with a social group and can be achieved through self-awareness of one's membership, as well as emotional and evaluative significance of this membership [12] [35]. Identifying with a virtual community is believed to stem from an understanding of the benefits of the membership [11]. A critical mass of users will help to convey such benefits. Prior studies have also demonstrated that digital environment may be socially rich for social identity to develop [29]. In the current study, if an individual perceives that most of their peers are using instant messaging for team collaboration, he or she will be more likely to realize the benefits of the membership and feel an obligation to participate in the group activities with other peers. Otherwise, he or she will be out of the communication loop and be viewed as an outsider by others [23]. In this case, he/she will develop a shared identity with the group. Therefore,

H9: Perceived critical mass will have a positive impact on social identity with the collaborative group.

Research Method

The purpose of this study is to examine the role of perceived critical mass in the development of we-intention. Data collection method, measures, and survey response are reported in this section.

Data Collection Method

A convenient sampling approach is adopted to test the hypotheses. The main data collection was conducted in a local university in Mainland China. Students from six randomly selected classes were invited to participate in. A screening question was employed to ensure that all respondents have used instant messaging for group project discussion. A pencil-and-paper survey was used for data collection. Before the survey was administered, a short briefing was given to explain the purpose and the scenario of this research and the respondents were asked to imagine in their mind the group members they often discussed with. These instructions were designed to capture the groups with which the respondents develop we-intentions to use instant messaging together. All participation in this study was completely voluntary yet motivated by a lucky draw among successful respondents.

Measures

As shown in Table 1, all measures used in this study have been validated in prior studies. Minor changes in the wording were made so as to fit into the current investigation context. In addition, a backward translation method was used to ensure the consistency between the Chinese and the original English version of the questionnaire.

Table 1. Summary of Psychometric Properties of the Measures

Construct	List of items	Loading	Source
Attitude (ATT) $\alpha=0.895$ $\beta=0.680$	Using instant messaging for team collaboration during the next two weeks would be: (7-point semantic scales) ATT1: foolish/wise ATT2: harmful/beneficial ATT3: bad/good ATT4: unpleasant/pleasant	0.838 0.789 0.870 0.801	[2]
Subjective Norm (SN) $\alpha=0.942$ $\beta=0.891$	SN1: Most people who are important to me think that I should/should not use instant messaging for team collaboration during the next two weeks. (7-point "should-should not" scale) SN2: Most people who are important to me would approve/disapprove of me using instant messaging for team collaboration during the next two weeks (7-point "approve-disapprove" scale)	0.953 0.935	[2]
Group Norm (GN) $\alpha=0.917$ $\beta=0.847$	Using instant messaging for team collaboration sometime during the next two weeks with the group members you often collaborated with can be considered as a goal. For each member in your group, please estimate the strength to which each holds the goal. (7-point "weak-strong" scale) GN1: Strength of the shared goal by the self. GN2: Average of the strength of the shared goal for other members.	0.931 0.909	[2]
Social Identity (SI) $\alpha=0.908$ $\beta=0.624$	SI1: How would you express the degree of overlapping between your own personal identity and the identity of the group you collaborate with through instant messaging when you are actually part of the group and engaging in group activities? (8-point "far apart-complete overlap" scale) SI2: Please indicate to what degree your self-image overlaps with the	0.694	[2]

	identity of the group of partners as you perceive it. (7-point "not at all-very much" scale)	0.802	
	SI3: How attached are you to the group you collaborate with through instant messaging? (7-point "not at all-very much" scale)	0.828	
	SI4: How strong would you say your feelings of belongingness are toward the group? (7-point "not at all-very much" scale)	0.820	
	SI5: I am a valuable member of the group. (7-point "does not describe me at all-describe me very well" scale)	0.787	
	SI6: I am an important member of the group. (7-point "does not describe me at all-describe me very well" scale)	0.800	
Perceived Critical Mass (PCM) α=0.907 β=0.829	PCM1: Most students in my class used instant messaging for team collaboration frequently. (7-point "disagree-agree" scale)	0.918	[23]
	PCM2: Most students in my group used instant messaging for team collaboration frequently. (7-point "disagree-agree" scale)	0.903	
We-Intention (WE) α=0.901 β=0.820	WE1: I intend that our group use instant messaging for team collaboration together sometime during the next two weeks. (7-point "disagree-agree" scale)	0.918	[2]
	WE2: We intend to use instant messaging for team collaboration together sometime during the next two weeks. (7-point "disagree-agree" scale)	0.893	

Survey Responses

A total of 246 questionnaires were distributed, out of which 227 usable questionnaires were returned. Of the respondents, 149 were male and 78 were female. A large majority (55.1%) of the respondents aged between 21 and 25. On the whole, the respondents were relatively experienced in using instant messaging and spent more than one hour on instant messaging per day. Table 2 provides the overall sample characteristics.

Table 2. Sample Characteristics

Characteristics	Number (N=227)	Percentage (%)
Age		
<21	68	30.0%
21-25	125	55.1%
>25	34	14.9%
Gender		
Male	149	65.6%
Female	78	34.4%
Experience with Instant Messaging		
<2 Years	12	5.3%
2-5 Years	139	61.2%
>5 Years	76	33.5%
Time spent on Instant Messaging per day		
<1 Hour	51	22.5%
1-2 Hours	101	44.5%
>2 Hours	75	33.0%

Results

Partial Least Squares (PLS) was used to test the proposed research model. The PLS procedure [39] is a second-generation multivariate technique which can assess the measurement model and the structural model simultaneously in one operation. In addition, PLS has the ability to model latent constructs under condition of non-normality and makes minimal demands in term of the sample size to validate a model. Following the two-step analytical procedures [15], the measurement model was first examined and then the structural model was assessed.

Measurement Model

Convergent validity was assessed by examining the composite reliability and the average variance extracted [15]. Composite reliability is the measurement for internal consistency. 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 [14]. As shown in Table 1, all the measurement exceed the recommended thresholds, with composite reliability (α) ranged from 0.895 to 0.942 and average variance extracted (β) ranged from 0.624 to 0.891.

Discriminant validity indicates the extent to which a given construct differs from other constructs. It can be verified by comparing the shared variances between constructs with the average variance extracted for each construct [14]. To demonstrate the adequate discriminate 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. Table 3 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 3. Correlation Matrix of the Constructs

	ATT	SN	GN	SI	PCM	WE
ATT	**0.825**					
SN	0.177	**0.944**				
GN	0.296	0.044	**0.920**			
SI	0.525	0.124	0.462	**0.790**		
PCM	0.318	0.065	0.247	0.412	**0.910**	
WE	0.403	0.090	0.417	0.469	0.441	**0.906**

* The bold numbers in the diagonal row are square roots of average variance extracted

Structural Model

The results of the analysis are depicted in Figure 2, which presents the overall explanatory power, the estimated path coefficients (all significant paths are indicated with asterisks), and the associated t-value of the paths. Test of significance of all paths were performed using the bootstrap re-sampling procedure. The model accounts for 35.6% of the variance in we-intention to use instant messaging for team collaboration. The results show that perceived critical mass has the strongest impact on we-intention, with a path coefficient at 0.263, followed by group norm, social identity and attitude, with path coefficients at 0.225, 0.171 and 0.160 respectively. In addition, perceived critical mass exerts statistically significant effects on social identity, attitude and group norm, with path coefficients at 0.412, 0.318 and 0.247 respectively. As we hypothesized, subjective norm does not play any role in our current investigation context.

Note: *P<0.05, **p<0.01, ***p<0.001
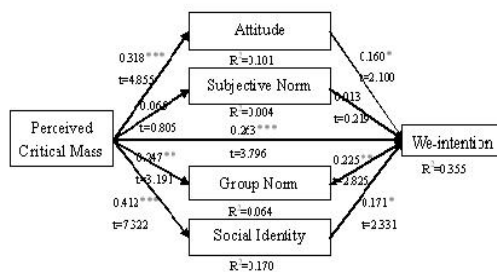
Figure 2. Results of Hypotheses Testing

Discussion and Conclusion

Instant messaging becomes a basic communication tool in today's business environment, allowing for real-time group discussion and rapid file transfer. This study tries to investigate the motivations of using instant messaging for team collaboration, with particular emphasis on the role of perceived critical mass in we-intention formation. In this section, we first discuss the key findings, followed by limitations of this study and the implications for both research and practice.

Discussion of Key Findings

In this study, we conceptualize the use of instant messaging as an intentional social action and integrate critical mass theory and social influence framework with theory of reasoned action. The measurement model is confirmed with adequate convergent and discriminant validity of all the measures and the structural model explains 35.5% of the variance in we-intention. The results support all the relationships proposed in the research model.

Consistent with theory of reasoned action, attitude toward the use of instant messaging exerts a statistically significant effect on usage we-intention. In addition, social influence factors, except for subjective norms, are significant factors predicting we-intention to use instant messaging for team collaboration. Users who have similar goals with others or categorize themselves as group members are more likely to have we-intentions to use instant messaging together. This finding is also consistent with prior studies investigating social influence processes in virtual communities [7] [32]. The insignificance of subjective norm in our current investigation context may be due to the fact that compliance acts only under conditions of mandatory use and for users with limited experience [20]. Perceived critical mass plays significantly in our research model. It influences we-intention both directly and indirectly through users' attitude and social influence processes. These findings echo with prior literature demonstrating that perceived critical mass may influence the adoption and diffusion of communication technologies through both informational influence and normative influence [23].

Limitations

Before highlighting the implications for research and practice, we first discuss the limitations of this study. First, the data was collected from a student sample with high experience in using instant messaging. We-intention is formed when they use instant messaging for group project discussion, which is different in nature from the tasks conducted in other social or business contexts. Although university students are the major users of instant messaging and they also represent the future workforce, generalization of the findings of this study should be made with caution. Treating employees in the non-laboratory workplace as survey subjects is strongly recommended in future research. Second, we have not examined the actual instant messaging usage behavior in this study. A longitudinal study is highly recommended for future research on this topic. Third, our research model only explains 35.5% of the variance in we-intention. Future research should extend this line of inquiry and incorporate additional factors investigating collective action in our research model to improve the quality of the model and thus its predictive ability.

Implications for Research

This study contributes to existing research on the adoption and use of communication technologies in two important ways. First of all, previous studies concerned with communication technologies acceptance primarily focused on the individual intention approach, which refers to an individual makes his/her own decision to adopt or use a technology. However, communication technology requires collective efforts and shared responsibility, and in this situation the decisions to adopt are interdependent. In the implementation of communication technology, people will be influenced by their own perceptions about the technology, as well as the actions taken by their peers [23]. In the current study, we present an attempt to regard we-intention, instead of an individual intention, as the dependent variable in our research model and empirically examined the possible antecedents of we-intention to use instant messaging for team collaboration. We believe that this study has the potential to contribute to the IT adoption literature, especially communication technology adoption. This study thus provides an opportunity for future research to develop knowledge in the area of collective acceptance of information technologies. In particular, future research should examine we-intention in the use and deployment of social computing technologies (e.g., wiki, weblogs, discussion forums, youtube, etc).

Second, this study also advances theoretical discourse on the role of perceived critical mass in explaining information systems usage intention. While prior studies emphasized the role of users' perception from the innovation itself, such as perceived usefulness, perceived ease of use [23], perceived innovation characteristics [18] and perceived enjoyment [22], in mediating the relationship between perceived critical mass and usage intention, the empirical results of this study further suggested that internalization and identification are two most important social influence processes through which perceived critical mass predicts we-intention to use instant messaging. Future research thus should continue this line of research and further investigate the mechanisms (such as internalization and identification) through which perceived critical mass may lead to collective acceptance of communication technologies.

Implications for Practice

The results of this study also provide useful insights to practitioners. This issue is managerially important because the use of instant messaging in the workplace continues to grow at a steady pace. Based on the findings of this study, here are some guidelines for managers who are using instant messaging for team collaboration.

First, group norm and social identity play important roles in determining we-intention to use instant messaging for team collaboration. In this sense, people with common goals or shared identity will be more likely use instant messaging together. Business managers thus should help employees promote their understanding toward the group norm and their belongingness to the collaborative team. Some practical recommendations include making the group norm explicit through public files such as FAQ or bulletin, providing regular opportunities for group discussion, and building a satisfying relationship among the group members. In addition, managers should take into account some special features of instant messaging in the development of the shared goals and in facilitating employees' identification with the working team. To achieve this, for example, managers could apply chat room or IM group provided by instant messaging services in a flexible way.

Second, the significance of perceived critical mass also provides some important practical implications for business managers. It is necessary to recognize that a critical mass of users is essential for the successful implementation of communication technologies. Managers thus should encourage the use of instant messaging in the initial implementation stage to achieve a perception of critical mass. Some possible strategies include targeting groups whose members have close working relationships with each other, encouraging word-of-mouth communication among early users and potential users, and making the early adopters more visible to the majority. In addition, the perception of critical mass is heavily influenced by the acceptance of this technology within the visible and relevant sub-networks. Managers thus could promote the use of communication technology in a visible sub-group first, this will further convey an overall impression to employees and other sub-networks that critical mass has been achieved.

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