Assessing the mediating role of online social capital between social support and instant messaging usage

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ABSTRACT

This study validates a research model that examines usage of instant messaging (IM) from the aspect of online social support. Drawing on the social capital theory, this study postulates that IM usage is indirectly affected by social support via the mediation of the following six dimensions of social capital: commitment, reciprocity, shared codes and language, shared narratives, centrality, and network ties. The model tests data obtained from business organizations in Taiwan, and the results suggest that the indirect influence of social support on IM usage through shared codes and language is significant, and the indirect influence of social support on IM usage through centrality is also significant. Managerial implications and limitations of the empirical findings are provided.

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1. Introduction

Virtual communities in practice consist of large knitted and geographically distributed groups of online users engaged in shared activities. While e-mail has been the dominant communication technology across virtual communities, another widely diffused and mature innovation is instant messaging (IM), which is well-known for its interactive online communication (Li et al. 2005). IM is a popular online, real-time, mobile computer-mediated communication technology (Zaman et al. 2010). Millions of people use IM with their friends and families for online social communication (Li et al. 2005). To date, IM usage has been further extended to business settings (Shiu and Lenhart 2004) such as communication among co-workers, sales promotions between buyers and sellers, and so on (Li et al. 2005).

Although IM users may not meet each other face-to-face, many are able to build a social relationship and foster interactions with one another, suggesting the importance of understanding social capital in IM virtual communities. Regardless of the increasing importance of online social capital in influencing individuals' IM usage, little attention has been paid to such capital in the IM usage literature. Most of the contemporary research models cover IM usage, such as the technology acceptance model (Lu et al. 2009, Wang et al. 2004), the motivational model (Lee et al. 2007, Li et al. 2005), the theory of planned behavior (Lin et al. 2006, Lu et al. 2009, Zhou 2007), the model of innovation diffusion theory (Rouibah and Hamdy 2009), and the unified theory of acceptance and use of technology (Lin and Bhattacherjee 2008, Park et al. 2007). These studies have all ignored the potential role of social capital in affecting IM usage.

Social capital is defined as an important resource embedded in a social structure, which is accessed and/or mobilized in deliberate action (Lin 2001, Song and Lin 2009). Social capital has been well applied to explain a variety of pro-social behaviors (such as online information exchanging and online experience sharing with others) that other forms of capital (e.g., human or financial capital) are unable to clarify (Bottrell 2009, Coleman 1990), suggesting its substantial influence on IM usage for pro-social behaviors. Whereas other forms of capital are established on the basis of financial assets or particular individuals, social capital resides in the interpersonal fabric of relationships embedded in the social realm (Putnam 1995, Wasko and Faraj 2005). With the continuous breakthrough of technology infrastructures, there is increasing evidence that users who have accumulated certain social capital are likely to use IM for maintaining frequent social interactions and relationships (Cummings et al. 2006), which is comparable to the mutual interactions in face-to-face settings (e.g., Walther and Boyd 2002). Unfortunately, the key antecedents of social capital in IM contexts remain unknown in previous studies, and thus this study's purpose is to explore IM usage caused by various social capital factors and their antecedents.

This study differs from previous research in two critical ways. First, while some literature links social capital and social support

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to IT usage which focuses on qualitative rationales (e.g., Drentea and Moren-Cross 2005), this study complements the previous qualitative studies by providing empirical confirmations and by examining various dimensions of social capital in greater depth. Particularly, this study decomposes social capital into six specific constructs – commitment, reciprocity, shared codes and language, shared narratives, centrality, and network ties – that help e-commerce marketers or corporate managers learn about efficient approaches in order to strengthen people's IM usage. Second, although previous research finds that health-related Internet use is associated with social support among online individuals (Kalichman et al. 2003), previous research rarely discusses how the association between social support and IM usage may be fully mediated and by what factors. This study empirically confirms whether such associations are fully or partially mediated by social capital, further complementing the previous research.

The rest of the paper proceeds as follows. The next section describes the theoretical underpinnings of social capital and formulates a research model of IM usage based on social capital as the mediator. The third section presents our research methods, including our choice of empirical context, subject samples, and instrumentation. The fourth section describes the data analysis procedures and results. The fifth section outlines the implications of our findings for future IM usage research and practice, and then identifies the study's limitations.

2. Social capital theory and hypotheses' development

2.1. Social capital and IM usage

Social capital can be used for understanding individuals' IT usage (e.g., He et al. 2009), because social capital complements the medium theory as it explains what situations are important for individuals to voluntarily interact with online contacts to an extensive degree (Radin 2006). Particularly, online social capital influences the usage of IM that supports social networking. Since productivity tools such as Microsoft Office Word or EKR (electronic knowledge repositories) are primarily utilitarian in workplaces, it may be possible that online social capital plays a less important role in its use than that of self-efficacy (Lin and Huang 2009, Kankanhalli et al. 2005). However, this does not suggest that social capital has no influence on usage behavior of information systems (e.g., knowledge management systems, KMS). In the studies by Lin and Huang (2009) and Kankanhalli et al. (2005), the effects of social capital are significant. He et al. (2009) conclude that employees are more dependent on a trustworthy social relationship based on a set of shared values and norms (p. 179). They further state that such a social relationship based on a social capital perspective (p. 176) evolves into even more communication and interaction, and thus "people exhibited a commitment to continue using the KMS" (p. 179). For instance, online individuals may easily apply IM to create knowledge or share information over open settings (e.g., online bulletin boards) via social interactions, given that online communities provide an environment conducive to the development of social capital (e.g., Nahapiest and Ghoshal 1998, Wasko and Faraj 2005). Moreover, previous research regarding employees' relationships and their technology acceptance argues that users' usage intention relies heavily upon the beliefs employees have about their social relationships with their team members (Magni and Pennarola 2008). Moreover, social norms (a form of social capital) have been confirmed to be a determinant of technology usage, but not vice versa (Hsu and Lu 2004, Wang et al. 2004). Collectively, individuals' social capital substantially helps strengthen their subsequent technology usage (e.g., IM).

An individuals' IM usage is hypothetically driven by social capital, including three dimensions: (1) structural links or connections between online individuals, which are named structural capital; (2) individuals' cognitive capabilities that help them to have a shared system of understanding among the individuals, also known as cognitive capital; (3) social online relationships that have strong, positive characteristics, which are named relational capital. Given that these three dimensions of social capital are positively related with individuals' technology usage, social support proposed as antecedents in this study hypothetically affects IM usage through the three dimensions. Specifically, subscribers' usage is considered an outcome driven by social and individual factors in the majority of previous e-commerce research (e.g., Chau et al. 2007, Kim et al. 2010, Lee 2009, Rouibah 2008, Rouibah and Hamdy 2009, Yoon and Kim 2007).

Many studies in the literature have argued that technology usage is the outcome of social networking (e.g., Cheung and Lee 2010, Lin and Bhattacherjee 2008), and not vice versa. For example, Zhang (2009) surveys users from popular social networking sites to test the validity of the research model, confirming that there is a direct influence from social networking (i.e., online community) on users' system usage. Based on the consensus mentioned above, the mediating role of social capital between social support and IM usage is discussed in the following section:

2.2. Social support and social capital

Social support is defined as "the exchange of verbal and non-verbal messages conveying emotion, information, or referral, to help reduce one's uncertainty or stress" (Walther and Boyd 2002, p. 154). Social support represents a focal point around which social ecological models of human interaction and social actions can develop (Vaux 1988). A support group that provides social support is likely to offer relative social capital in which an embedded community is activated for purposeful action (Lin 2001). This implies a linkage from social support to social capital. Social capital can be seen as capital in which relations with friends, neighbors, relatives, and colleagues supply shared support, because it provides companionship, emotional support, information, and a sense of belonging (Wellman and Frank 2001).

Although social support has been traditionally examined in previous research within the context of personal, face-to-face social capital, there is increasing evidence that social support obtained via IM helps derive social capital to a degree which is comparable to that found in face-to-face settings. In other words, people aggregate across communities to share valuable information, experiences, or empathy about a common cause (such as coping with terminal illnesses such as cancer or AIDS), overcoming personal crises (such drug or alcohol addiction), or sharing profit-making opportunities like stock tips or rumors. Taken as whole, these are activities that are likely to establish strong online social capital. For example, the "Systers" mailing list was originally intended for female computer scientists to provide online social support, but then it evolved into a forum for deriving online social capital. Online social support is indeed effective in fostering online social capital, even when those involved are virtual strangers.

The substantial influence of support on social capital has already been indicated in a study covering an Internet mothers' website (Drentea and Moren-Cross 2005). Particularly, online social support was provided by users who offered formal guidelines and informal information-sharing services as a resource to Internet mothers and was likely to boost the mothers' technology usage (Drentea and Moren-Cross 2005). This reveals that social capital emerges through the diffusion of online social support.

The dynamics of IM-mediated social support and social capital remain quite different from those of face-to-face social support and social capital, given the geographically-dispersed nature of online networks, the willingness of network members to trust and

interact with virtual strangers, and the frequent participation of online members in multiple online communities to meet different social needs. Details about the influence of social support on social capital in online contexts are provided below.

2.3. Online relational capital

Online social support associated with an affective response based on the social relationship within online communities is referred to as relational capital characterized by commitment and reciprocity (e.g., Nahapiet and Ghoshal 1998). Social support impacts both commitment and reciprocity. First, reciprocity reflects the anticipation that online users' collective efforts will be reciprocated (Wasko and Faraj 2005). As a basic norm of reciprocity is a social cognition of interpersonal indebtedness, online users are likely to reciprocate the online social support they receive from others, ensuring ongoing social support exchanges (e.g., Shumaker and Brownell 1984) and resulting in a positive relationship between social support and reciprocity. Second, commitment is an obligation to engage in future social activities which arise from frequent social interaction (Coleman 1990). Online commitment is likely amplified with a social perception of duty to support others within the collective communities on the basis of shared online membership (Wasko and Faraj 2005), leading to a positive relationship between social support and commitment.

Previous literature finds that online participation to provide social support may intensify reciprocity and trust (Quan-Haase et al. 2002, Quan-Haase and Wellman 2004). Similarly, a previous investigation shows that half of those who belong to online communities say that the Internet provides them with support to connect with people who reciprocally share their interests (Horrigan 2002), implying the influence of expressive and instrumental support on reciprocity. As noted in a study of online social support for Japanese mothers (Miyata 2002), in a supportive online community the norms of generalized reciprocity are easily established and maintained. Collectively, the above phenomenon offers a positive relationship between social support and social capital (e.g., reciprocity and commitment), and the hypotheses about IM usage are derived as follows.

H1. Users' social support directly influences their commitment and indirectly influences IM usage via the mediation of the commitment.

H2. Users' social support directly influences their reciprocity and indirectly influences IM usage via the mediation of the reciprocity.

2.4. Online cognitive capital

Online users' cognitive capital, reflected by shared codes, language, and narratives, includes online resources which make possible shared meanings, connotation, and stories among the users of a virtual community. Engaging in a meaningful sharing of useful information and benevolent advice (i.e., a form of social support) helps facilitate certain levels of shared understanding among individuals who contain shared codes, languages, and narratives (Nahapiet and Ghoshal 1998, Wasko and Faraj 2005).

The relationship between social support and cognitive social capital (e.g., shared codes, languages, and narratives) has been bolstered by the communication accommodation theory, which explains some of the cognitive reasons for code-switching and other exchanges (e.g., shared languages and narratives) in interpersonal communications as individuals seek to emphasize or minimize the social differences between themselves and their contacts (Buller and Aune 1992, Willemyns et al. 1997). Previous research studies indicate that meaningful communication, which is an essential part of social exchange and combination processes, requires at least some sharing of context between the parties to such an exchange (Boisot 1995, Boland and Tenaski 1995). This sharing comes from two major sources: shared codes and language and the shared narratives (Nahapiet and Ghoshal 1998, Swarbrick 2002).

Social support helps strengthen narratives told over time, because narratives that are considered as war stories or workarounds provide insights into what individuals can do to support others when they need to resolve difficulties in life (e.g., Brown and Duguid 1991). Previous literature finds emotional support, instrumental support, and community building all contribute to the creation and maintenance of shared codes, language, and narratives (e.g., women share their personal stories about miscarriages and implantation bleeding via the Internet) (Drentea and Moren-Cross 2005, Litt 2000). Given that shared codes, language, and narratives jointly provide a frame of reference for interpreting the social environment (Wasko and Faraj 2005) in which social support occurs, online cognitive capital turns out to be an important outcome of social support. In summary, individuals' understanding of shared codes, language, and narratives is likely to be lifted by strong social support, leading to the following hypotheses.

H3. Users' social support directly influences their shared codes and language and thus indirectly influences IM usage via the mediation of shared codes and language.

H4. Users' social support directly influences their shared narratives and thus indirectly influences IM usage via the mediation of shared narratives.

2.5. Online structural capital

The social capital theory suggests that structural capital is comprised of both centrality and network ties and is accumulated through interpersonal interactions in social communities. Therefore, structural capital is a critical outcome of collective action. The social support received from others is a typical initiator of collective action, suggesting its role in influencing structural capital.

The relationship between social support and structural social capital has been bolstered by the social network theory (Reagans and Zuckerman 2001). Social network scholars have taken the lead in formalizing and empirically testing issues related to structural social capital and regard network ties or relationships as the basic data for analysis (Seibert et al. 2001). Network ties among individuals of a social supportive group are often strong, while network ties that reach outside individuals' social clique are weak (Granovetter 1982, Seibert et al. 2001). This signifies a positive effect of social support on structural social capital.

When individuals' collective actions such as social support, collaboration, and contribution to others in online communities are achieved, they are likely to consider online communities as an important part of their life. To put it differently, the stronger the social support is that IM users receive from online contacts, the more strongly the online centrality is perceived by them. Specifically, IM can be moved from a text to a voice dialogue, building a deeper communication as needed (Oliva 2003). This further facilitates IM users to possess shared codes and languages and a sense of centrality.

In addition to centrality, individuals' network ties that reflect online structural capital to a certain degree are relevant for the amount of social support available to individuals within online

communities. Previous literature suggests that IM and text messaging are both forms of technology-mediated communication that provides a tool for individuals to communicate in social support talks with one another and consequently helps to create and reinforce social ties and friendships (Boneva et al. 2006, Bryant et al. 2006). The more social support individuals receive from online contacts, the tighter ties they establish with others due to their strong social networking. Thus, the hypotheses are provided below.

H5. Users' social support directly influences their centrality and thus indirectly influences IM usage via the mediation of the centrality.

H6. Users' social support directly influences their network ties and thus indirectly influences IM usage via the mediation of the network ties.

3. Method

3.1. Measures

This study's hypotheses are empirically tested using a survey of instant messaging (IM) technology usage among employees in Taiwan. IM allows users to obtain social support via real-time communication on the Internet. IM was chosen for this study, because it is an advanced interactive information technology that lends itself particularly well to a virtual world in which online individuals obtain online social support.

IM is a near-synchronous communication tool (Nardi et al. 2000). Similar to online chat rooms, IM allows users to type messages into a window, but like the phone it is based on a dyadic "call" model (Nardi et al. 2000). IM users sometimes intentionally use IM (instead of e-mail) as a sticky note, because they know it is visible as soon as the person returns to his/her computer, and it is easier to retrieve and respond to in a timely manner than e-mail (or voicemail) (Isaacs et al. 2002). When comparing e-mail and IM, the previous literature indicates that people use IM more than e-mail for long-distance or social-related communication, but they use e-mail more than IM for communicating with people they know offline (Recchiuti 2003). For example, since e-mail allows people to have a chance to think about what they want to say, they feel more comfortable using e-mail to contact their supervisors or managers (i.e., task-related communication) (Recchiuti 2003). For social-related communication such as communicating with friends, IM is more influential than e-mail and online chat rooms (Recchiuti 2003).

During our investigation, a manager in a consulting company provided the necessary assistance for surveying subjects randomly drawn from seven large companies that are clients of the consulting company. Two of the seven large companies are from the general service industries and the other five companies are from high-tech industries (related to both servicing and manufacturing). Of the 500 questionnaires distributed to subjects, 364 usable questionnaires were returned to the researcher for a response rate of 72.8%. Our respondents consisted of 62.6% males and 37.4% females. Of these respondents, 38.5% are under 29 years old, while 45.1% are between 30 and 39 years old. The remaining 16.4% are 40 years old or older. Additionally, 10.4% have experience using IM for less than a year, 37.4% have experience for 1–2 years, and 52.2% have experience for more than two years. The sample also reveals that 11.0% are high school graduates, 57.7% are college graduates, and 31.3% are graduate school graduates.

The constructs in this study are measured using five-point Likert scales drawn and modified from previous literature. A univer-

sity professor and four graduate students who are familiar with online behavior worked together as a focus group to help evaluate the appropriateness of the measurement items. The pilot test data collected from 50 student subjects were subjected to exploratory factor analysis (EFA) and reliability analysis in order to identify items that loaded poorly on their hypothesized scales, which were then re-worded. This process of instrument refinement led to considerable improvement in content validity and scale reliability. Note that the pilot test respondents were excluded in the subsequent survey. Finally, tips from back-translations as indicated by Reynolds et al. (1993) were applied in composing an English version questionnaire and a Chinese one. A high degree of correspondence between the two questionnaires assured that the translation process did not introduce substantial translation biases in the Chinese version of the questionnaire.

Previous studies (e.g., Hirsch 1980, Cutrona and Suhr 1992) have proposed typologies of social support, including the following: (1) emotional support, such as expressions of caring, concern, and sympathy toward relieving pain and stress; (2) socializing support, such as providing companionship or verbal reinforcement about one's choices; (3) instrumental support, such as providing financial or practical assistance (e.g., job referrals) for a network member in need; and (4) informational support, such as offering advice, factual input, and feedback to help network members evaluate actions and make decisions (Lin and Bhattacherjee 2009). Due to a potential overlap among these four typologies mentioned above, this study categorizes social support into two types: (1) expressive support that contains the first two typologies above and (2) instrumental support that includes the last two typologies above. The dimension reduction for four typologies is essential, because these four typologies that are highly correlated with each other may be confusing and detrimental for researchers when trying to provide clear and specific managerial recommendations.

Expressive support with four items and instrumental support with four items are drawn and refined from Eastin and LaRose (2005), who modify the items from Cohen et al. (1984). Commitment with three items and reciprocity with three items are modified from Wasko and Faraj (2005). However, as there are no suitable scale items for shared codes, language, and narratives in the existing research, this study develops three items for shared codes and language and another three items for shared narratives based on the definition of cognitive capital in previous literature (Nahapiet and Ghoshal 1998, Wasko and Faraj 2005) through the use of a focus group. Centrality with three items and network ties with four items were modified from Obst and White (2005). IM usage with four items was modified from Cheung et al. (2000). These items are confirmed to be effective, because they accurately reflect the users' IM usage in terms of duration, intensity, and frequency (Cheung et al. 2000). Collectively, these constructs were modified from previous literature by being embedded with the features related to IM usage. Appendix A lists all the measurement items in detail.

4. Data analysis

4.1. Measurement model testing

The final survey data with a sample size of 364 responses were analyzed via a two-step structural equation modeling (SEM) approach proposed by Anderson and Gerbing (1988) using SAS software. The first stage performed a confirmatory factor analysis (CFA) on all data collected to assess scale reliability and validity. The second stage examined the structural model for testing the hypotheses. The test results from the two stages are described as follows.

CFA analysis was done on all items corresponding to the nine constructs. The goodness-of-fit of the hypothesized CFA model was assessed applying a variety of fit metrics, as shown in Table 1. The normed fit index (NFI) and the adjusted goodness-of-fit index (AGFI) were both slightly lower than the recommended value of 0.9, while the normalized chi-square (chi-square/degrees of freedom) of the CFA model was smaller than the recommended value of 3.0. The root mean square residual (RMR) was smaller than 0.05, and the root mean square error of approximation (RMSEA) was smaller than 0.08. At the same time, the comparative fit index (CFI), the non-normed fit index (NNFI), and the goodness-of-fit index (GFI) all exceeded 0.90. These figures reveal that the CFA model hypothesized in this study fits the empirical data well (Bentler and Bonnett 1980).

Convergent validity was assessed applying three criteria suggested by Fornell and Larcker (1981). First, all factor loadings in Table 1 were statistically significant at $p < 0.001$ to assure convergent validity of construct (Anderson and Gerbing 1988). Second, the reliabilities for each construct exceeded 0.70 in Table 1, satisfying the general requirement of reliability for research instruments. The average variance extracted (AVE) for all constructs exceeded 0.50 except for two constructs (reciprocity and centrality) being slightly lower than 0.5, indicating that the measurement items overall captured sufficient variance in the underlying construct than those attributable to measurement error (Fornell and Larcker 1981). Some AVEs of social capital constructs were slightly lower than 0.5 and may have been caused by three potential reasons related to our discordant sample subjects between males (62.6%) and females (37.4%). First, the previous literature indicates that females are hindered in their efforts to achieve career advancement and its associated benefits owing to their inability to access social capital (Timberlake 2005). Second, prior research

(Darley and Smith 1995) indicates that females are comprehensive information processors who consider both subjective and objective question attributes and respond to subtle cues (during a questionnaire survey). Conversely, males are selective information processors who tend to use heuristics processing and miss subtle cues (Darley and Smith 1995). Such phenomenon could slightly diminish the variance extracted estimates of our factors. Third, the significant gender-related differences in exposure to and use of computers (e.g., IM usage) have been confirmed (Bannert and Arbinger 1996, Celik and Ipcioglu 2007, Liu and Chang 2010, Park 2009, Sánchez-Franco 2007, Wang 2010). These differences may be another source that lessens the variance extracted estimates of our online social capital.

Due to the three possible reasons described above, the amount of variance that is captured by an underlying factor in relation to the amount of variance due to measurement error is thus slightly lower in this study. To further detect the cause of low AVEs in our constructs (i.e., reciprocity and centrality), we conducted post hoc analyses by splitting the data into two different gender subgroups (males vs. females) based on our CFA model and then calculated separate AVEs for each gender. The empirical results summarized in Appendix B indicate that the AVEs for females are

Table 1
Standardized loadings and reliabilities.

Construct	Indicators[a]	Standardized loading	AVE	Cronbach's α
Expressive support	ES1	0.93 ($t = 21.94$)	0.73	0.88
	ES2	0.95 ($t = 22.70$)		
	ES3	0.66 ($t = 13.84$)		
Instrumental support	IS1	0.83 ($t = 16.74$)	0.53	0.76
	IS2	0.66 ($t = 12.59$)		
	IS3	0.68 ($t = 13.08$)		
Commitment	CO1	0.80 ($t = 15.68$)	0.50	0.73
	CO2	0.65 ($t = 12.29$)		
	CO3	0.66 ($t = 12.60$)		
Reciprocity	RE1	0.76 ($t = 14.33$)	0.49	0.74
	RE2	0.72 ($t = 13.55$)		
	RE3	0.62 ($t = 11.54$)		
Shared codes and language	SC1	0.75 ($t = 14.62$)	0.51	0.76
	SC2	0.71 ($t = 13.67$)		
	SC3	0.69 ($t = 13.13$)		
Shared narratives	SN1	0.93 ($t = 20.52$)	0.64	0.81
	SN2	0.86 ($t = 18.36$)		
	SN3	0.56 ($t = 11.02$)		
Centrality	CE1	0.72 ($t = 14.01$)	0.49	0.74
	CE2	0.69 ($t = 13.28$)		
	CE3	0.69 ($t = 13.43$)		
Network ties	NT1	0.79 ($t = 15.78$)	0.53	0.77
	NT2	0.72 ($t = 13.98$)		
	NT3	0.66 ($t = 12.76$)		
IM usage	IM1	0.81 ($t = 16.12$)	0.50	0.73
	IM2	0.65 ($t = 12.40$)		
	IM3	0.64 ($t = 12.15$)		

Goodness-of-fit indices ($N = 364$): $\chi^2_{288} = 493.77$ (p-value < 0.001); NNFI = 0.93; NFI = 0.88; CFI = 0.95; GFI = 0.91; AGFI = 0.88; RMR = 0.02; RMSEA = 0.04.
[a] Indicators remaining after CFA purification. A few indicators are excluded from this measurement model due to their insignificance.

Table 2
Chi-square difference tests for examining discriminant validity.

Construct pair	$\chi^2_{288} = 493.77$ (unconstrained model)	
	χ^2_{169} (constrained model)	χ^2 difference
(Expressive support, Instrumental support)	768.12	274.35[***]
(Expressive support, Commitment)	731.11	237.34[***]
(Expressive support, Reciprocity)	734.14	240.37[***]
(Expressive support, Shared codes and language)	753.24	259.47[***]
(Expressive support, Shared narratives)	942.44	448.67[***]
(Expressive support, Centrality)	715.13	221.36[***]
(Expressive support, Network ties)	765.77	272.00[***]
(Expressive support, IM usage)	725.40	231.63[***]
(Instrumental support, Commitment)	671.66	177.89[***]
(Instrumental support, Reciprocity)	696.96	203.19[***]
(Instrumental support, Shared codes and language)	742.30	248.53[***]
(Instrumental support, Shared narratives)	745.40	251.63[***]
(Instrumental support, Centrality)	594.99	101.22[***]
(Instrumental support, Network ties)	643.45	149.68[***]
(Instrumental support, IM usage)	631.61	137.84[***]
(Commitment, Reciprocity)	631.71	137.94[***]
(Commitment, Shared codes and language)	626.56	132.79[***]
(Commitment, Shared narratives)	713.84	220.07[***]
(Commitment, Centrality)	600.02	106.25[***]
(Commitment, Network ties)	653.82	160.05[***]
(Commitment, IM usage)	619.39	125.62[***]
(Reciprocity, Shared codes and language)	655.91	162.14[***]
(Reciprocity, Shared narratives)	723.93	230.16[***]
(Reciprocity, Centrality)	635.74	141.97[***]
(Reciprocity, Network ties)	697.35	203.58[***]
(Reciprocity, IM usage)	669.19	175.42[***]
(Shared codes and language, Shared narratives)	727.31	233.54[***]
(Shared codes and language, Centrality)	633.94	140.17[***]
(Shared codes and language, Network ties)	725.81	232.04[***]
(Shared codes and language, IM usage)	648.10	154.33[***]
(Shared narratives, Centrality)	692.89	199.12[***]
(Shared narratives, Network ties)	726.04	232.27[***]
(Shared narratives, IM usage)	710.23	216.46[***]
(Centrality, Network ties)	601.70	107.93[***]
(Centrality, IM usage)	566.00	72.23[***]
(Network ties, IM usage)	639.76	145.99[***]

[***] Significance at the 0.001 overall significance level by using the Bonferroni method.

higher than those for males, providing some support for our argument above. Nevertheless, the previous literature states that the test of AVEs (Fornell and Larcker 1981) is quite conservative and very often variance extracted estimates will be below 0.50, even when reliabilities are acceptable (Hatcher 1994, p. 331).

This study applied the chi-square difference tests for assessing discriminant validity. The advantage of using chi-square difference tests is that their simultaneous pair-wise comparisons for the constructs were based on the Bonferroni method. Controlling for the experiment-wise error rate yielded an overall significance level of 0.001, and the Bonferroni method suggests that the critical value of the chi-square difference should be 17.56. As the chi-square difference statistics for all pairs of constructs in Table 2 exceeded the critical value of 17.56, this study achieved the discriminant validity for the data sample. The test results suggest that the instruments used for measuring the constructs of interest in this study are statistically adequate.

4.2. Structural model testing

After the above CFA was completed, this study performed structural model testing that reflected the hypothesized associations for the purpose of hypotheses' testing. To avoid unpredictable biases caused by individuals' age and their industry, this study includes both of them as control variables in our structural modeling. Fig. 1 and Table 3 present the test results of this analysis.

The test results for the six hypotheses of this study are explained as follows. First, instrumental support rather than expressive support has an indirect influence on IM usage via the mediation of commitment, suggesting that H1 is only partially supported. Second, neither expressive support nor instrumental support has an influence on IM usage via reciprocity, suggesting that H2 is not supported. Third, both expressive support and instru-

mental support have an indirect influence on IM usage via the mediation of shared codes and language, supporting H3. Fourth, both expressive support and instrumental support have no influence on IM usage via shared narratives, suggesting that H4 is not supported. Fifth, both expressive support and instrumental support have an indirect influence on IM usage through the mediation of centrality, supporting H5. Lastly, both expressive support and instrumental support have no influence on IM usage via network ties, suggesting that H6 is not supported.

To further confirm the mediation effects of our six mediators (e.g., commitment, reciprocity, etc.) on IM usage, we conducted a post hoc analysis with four steps based on the recommendations from Baron and Kenney (1986) (see Appendix C). The test results presented in Appendix C confirm that when both the independent variables (i.e., expressive and instrumental support) and mediators (i.e., six social capital constructs) are used together to explain the outcome (i.e., IM usage) in step 4, the mediators which were significant in step 2 remain significant and the independent variables which were significant in step 3 are no longer significant. Such test results support the full mediation effects for some of our social capital dimensions (i.e., commitment, shared codes and language, and centrality). Overall, it would be assertive to conclude that social capital fully mediates the relationship between social support and IM usage. These empirical results suggest the mediating effects of social capital, fully or partially, and sometimes depend heavily on issues in which social capital is taken into account. For example, while Aquino and Serva (2005) find that social capital partially mediates the relationship between regular communication and perceived in-role performance, and Lin and Huang (2005) empirically show that the effects of human capital on developmental potential are fully mediated by social capital.

Based on the test results above, a further analysis for indirect effects is also performed as shown in Table 4. The analysis indicates
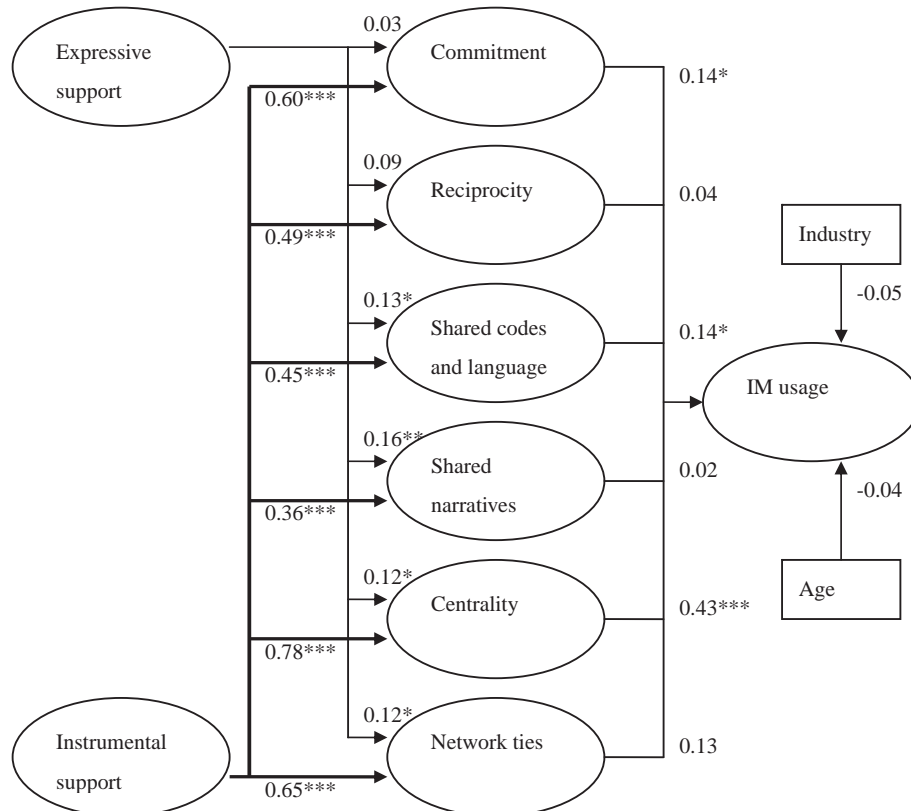

Fig. 1. Empirical test results. $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. *Note*: Industry and age are control variables.

Table 3
Path coefficients and *t* values.

Hypothesis	Standardized coefficient	*t* value
H$_1$: Expressive support → Commitment	0.03	0.46
H$_2$: Expressive support → Reciprocity	0.09	1.58
H$_3$: Expressive support → Shared codes and language	0.13*	2.27
H$_4$: Expressive support → Shared narratives	0.16**	2.98
H$_5$: Expressive support → Centrality	0.12*	2.14
H$_6$: Expressive support → Network ties	0.12*	2.19
H$_7$: Instrumental support → Commitment	0.60***	8.20
H$_8$: Instrumental support → Reciprocity	0.49***	6.81
H$_9$: Instrumental support → Shared codes and language	0.45***	6.37
H$_{10}$: Instrumental support → Shared narratives	0.36***	5.80
H$_{11}$: Instrumental support → Centrality	0.78***	9.44
H$_{12}$: Instrumental support → Network ties	0.65***	8.82
H$_{13}$: Commitment → IM usage	0.15*	2.10
H$_{14}$: Reciprocity → IM usage	0.05	0.72
H$_{15}$: Shared codes and language → IM usage	0.14*	2.11
H$_{16}$: Shared narratives → IM usage	0.02	0.30
H$_{17}$: Centrality → IM usage	0.43***	4.72
H$_{18}$: Network ties → IM usage	0.13	1.74

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

that social support, expressively and instrumentally, affects IM usage indirectly through three mediators in which centrality is the most influential one among the three mediators.

The unsupported H2, H4 and H6 based on Fig. 1 suggest that not all online social capital elements significantly influence IM usage. Because reciprocity, shared narratives, and network ties are all important and impact different aspects of individuals' behavior in the real world, they may be less influential to IM usage in the settings of a virtual world. Of course, this phenomenon does not suggest that the influence of social capital on IM usage should be completely ignored. Given that some social capital elements are still significantly influential to IM usage, the unexpected results for the unsupported hypotheses warrant further study.

The true reasons behind the unsupported hypotheses are not misinterpreted. To further explore our model, this study performed a post hoc analysis by removing three significant paths out of six model paths between social capital and IM usage. Structural modeling is then conducted and the test results show that the influence of both reciprocity and network ties on IM usage becomes significant with standardized coefficients of 0.24 ($p < 0.01$) and 0.41 ($p < 0.01$), respectively (whereas the influence of shared narratives on IM usage remains insignificant). The phenomenon may suggest future researchers to more carefully look into social capital from different dimensions.

5. Discussions

This study evaluates a formation of IM usage by considering social capital as an important theoretical mediator. It is argued that online communities, which provide the contingency for enhancing

social support both expressively and instrumentally, are likely to foster greater IM usage. Our empirical research (from the aspects of social support and social capital) emphasizes the social utility of developing and maintaining social relationships. This is an important but often ignored perspective of IM applications (Li et al. 2005).

The findings of this study shed light on several areas that could benefit marketers, service providers, or corporate managers. For example, employees who frequently provide social support to others via IM are likely to have intensive social capital and frequent IM usage. As a result, these employees may be effectively appointed as key coordinators who require high levels of responsiveness towards their co-workers (or customers) via IM. For instance, if the task of HRM service to employees in an organization is assigned to staff who reveal a low inclination of providing social support, then they are unlikely to establish social capital and become unable to solve problems (e.g., problems of training and education) with IM in a timely manner.

This study complements previous studies that have demonstrated the power of social influence in explaining virtual community participation (e.g., Bagozzi and Dholakia 2002, Dholakia et al. 2004). Particularly, the findings of this study help to distinguish different weights between six dimensions of social capital regarding their influence on IM usage. Marketers (or corporate managers) leveraging critical mediators (i.e., commitment, shared codes, and language and centrality) into position can be rewarding for the vendors and marketers in order to boost users' IM usage. The test results of this study suggest that IM usage is indirectly affected by social support via the mediation of different social capital dimensions – that is, low IM usage is likely attributed to a lack of commitment, shared codes and language, and centrality, which may be prompted by weak social support. This finding implies that vendors or marketers who want to promote their online product or service should establish supportive communities in which online individuals can easily obtain online social support. It is important that online promotion or incentives, such as virtual time dollars or gift vouchers that positively catalyze individuals' social support for online others, may be provided. In the long run, both expressive and instrumental support can become reciprocal and expanded, eventually boosting IM usage.

Given that centrality is one of the most influential mediators for motivating users' IM usage, marketers or corporate managers can make good use of this factor as a checkpoint to periodically assess both users' social support and their IM usage. The tests results of this study reveal that centrality can be a powerful role that significantly overwhelms other social capital dimensions. This finding is understandable, because most users in a modern society become heavily dependent on IM in their daily life, resulting in a significant role of centrality between social support and IM usage. Marketers should invent daily life activities (e.g., e-charity, e-group improvisation, or e-group creation) to enhance the opportunity for users to perform social support, strengthening their centrality and subsequent IM usage. Marketers can also invent online solutions that link people's daily events to online systems. For instance, IM users may be regularly reminded of providing social support to their friends (e.g., sending encourage-

Table 4
Analysis of indirect effects.

Path	Indirect effects through						Total effects
	Commitment		Shared codes and language		Centrality		
Expressive support → IM usage	0.000	(0%)	0.018	(26%)	0.052	(74%)	0.070
Instrumental support → IM usage	0.090	(18%)	0.063	(13%)	0.335	(69%)	0.488

ment e-cards) so that their perceived centrality and IM usage are strengthened.

This study collectively recommends that those marketers or managers who want to aggrandize users' IM usage can place emphasis on social support and the significant social capital dimensions empirically confirmed herein. The marketers or managers should learn that IM usage can be substantially discouraged if social support is ignored.

A major limitation of this study is the possibility of a common method bias due to a single questionnaire applied to measure all constructs, and this possibility could inflate the strength of the hypothesized relationships among these constructs. Researchers may apply different instruments rather than only a single set of questionnaires to obtain their data in the future. Another limitation is the cross-sectional survey employed in this study. The development of social capital leading to its outcomes, such as IM usage and knowledge sharing, is an ongoing phenomenon (e.g., Chiu et al. 2006), and IM usage may generate some feedback to social capital in the long run.

This study's social capital constructs were measured at a static point rather than as they were developing, hence losing some time richness of explanation (Chiu et al. 2006). Thus, future longitudinal research may complementarily support the findings of this study. Collectively, the model proposed and validated herein could benefit by further testing on the basis of a longitudinal survey. Future researchers can also improve the above shortcomings by observing the subjects' IM usage behavior over time so that genuine associations among research constructs in a virtual world can be transparently revealed. This study also suggests that an issue which future research should address is whether access to and participation in online communities perpetuate gender, age, and racial inequalities. Lastly, given that using IM is much cheaper than using a traditional phone or a mobile phone, the costs may be an important driver for users to employ such Internet-based communication tools (e.g., mobile instant messaging), which could be taken into account in future research.

Appendix A. Measurement items

Expressive support (1: Strongly Disagree; 5: Strongly Agree)

ES1. Over the last one month, I received adequate emotional concern from people using IM.
ES2. Over the last one month, I felt relieved by getting sympathy from online people using IM.
ES3. Over the last one month, I met many people on IM whose company I really enjoy.
ES4. Over the last one month, I have been encouraged to make some choices related to my career by online people using IM.

Instrumental support (1: Strongly Disagree; 5: Strongly Agree)

IS1. Over the last one month, I received numerous personal advice from online people using IM.
IS2. Over the last one month, I acquired a variety of information from online people using IM.
IS3. Over the last one month, I obtained sufficient assistance from online people using IM.
IS4. Over the last one month, I consulted online people using IM for practical issues and matters.

Commitment (1: Strongly Disagree; 5: Strongly Agree)

CO1. I would feel at a loss if IM were no longer available for my interaction with my friends (and/or relatives).
CO2. I care about the fate of IM regarding its future advancement on my communication efficiency with my friends (and/or relatives).
CO3. I feel a great deal of loyalty to IM due to its importance in my interaction with my friends (and/or relatives).

Reciprocity (1: Strongly Disagree; 5: Strongly Agree)

RE1. When using IM, I think that my friends (and/or relatives) and I should trust each other.
RE2. When using IM, I think that my friends (and/or relatives) and I should maintain a relationship with each other.
RE3. When using IM, I think that my friends (and/or relatives) and I need identification with each other.
RE4. I never think that I have obligations to improve the relationship with others on IM.

Shared codes and language (1: Strongly Disagree; 5: Strongly Agree)

SC1. When using IM, my friends (and/or relatives) and I understand each other with online jargon.
SC2. When using IM, my friends (and/or relatives) and I follow similar codes or rules.
SC3. When using IM, my friends (and/or relatives) and I easily obtain a consensus after discussion.

Shared narratives (1: Strongly Disagree; 5: Strongly Agree)

SN1. My friends (and/or relatives) and I share interesting narratives through our IM usage.
SN2. My friends (and/or relatives) and I enjoy pleasant dialogue through our IM usage.
SN3. My friends (and/or relatives) and I share life events in detail through our IM usage.

Centrality (1: Strongly Disagree; 5: Strongly Agree)

CE1. I often think of talking with my friends (and/or relatives) via IM.
CE2. I think that using IM to contact my friends (and/or relatives) reflects a part of centrality in my life.
CE3. I count on IM for interacting with my friends (and/or relatives).

Network ties (1: Strongly Disagree; 5: Strongly Agree)

NT1. I have a lot of interests in common with my friends (and/or relatives) who use IM.
NT2. I feel strong interpersonal ties with my friends (and/or relatives) who use IM.
NT3. I find it difficult to form a bond with my friends (and/or relatives) who use IM.
NT4. I feel a sense of being strongly connected to my friends (and/or relatives) who use IM.

IM usage (1: Strongly Disagree; 5: Strongly Agree)

IM1. I use IM very intensively.
IM2. I use IM very frequently.
IM3. I use IM for a variety of applications.
IM4. Overall, I spend a lot of time using IM.

Appendix B. AVE values of reciprocity and centrality

Construct	Indicators	Males		Females	
		Standardized loading	AVE	Standardized loading	AVE
Reciprocity	RE1	0.77 ($t = 11.28$)	0.47	0.77 ($t = 9.25$)	0.55
	RE2	0.68 ($t = 9.83$)		0.77 ($t = 9.20$)	
	RE3	0.59 ($t = 8.51$)		0.69 ($t = 7.98$)	
Centrality	CE1	0.71 ($t = 10.90$)	0.47	0.67 ($t = 7.85$)	0.51
	CE2	0.65 ($t = 9.82$)		0.75 ($t = 8.90$)	
	CE3	0.69 ($t = 10.56$)		0.71 ($t = 8.33$)	

Appendix C. Empirical tests of mediation effects and their regression coefficients

	Step 1						Step 2	Step 3	Step 4
	Commitment	Reciprocity	Shared codes and language	Shared narratives	Centrality	Network ties	IM usage	IM usage	IM usage
Independent variables									
Expressive support	0.07	0.09	0.13**	0.16**	0.14**	0.15**		0.13**	0.04
Instrumental support	0.28**	0.21**	0.13**	0.23**	0.44**	0.37**		0.36**	0.06
Mediators									
Commitment							0.15**		0.15**
Reciprocity							0.05		0.05
Shared codes and language							0.15**		0.15**
Shared narratives							0.03		0.03
Centrality							0.28**		0.26**
Network ties							0.15**		0.13**

* $p < 0.05$.

Notes: Step 1 presents that the mediator variables are explained by the independent variables (i.e., expressive and instrumental support).

Step 2 presents that the outcome (i.e., IM usage) is explained by the mediator variables.

Step 3 presents that the outcome (i.e., IM usage) is explained by the independent variables.

Step 4 presents that both the independent variables and mediators are used together to explain the outcome (i.e., IM usage).

** $p < 0.01$.

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