Social Environment of Virtual Collaboration Using Mobile Social Media

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Abstract

Mobile social media such as WhatsApp and WeChat greatly facilitate virtual collaboration within and across organizations. Based on the theory of self-interest and collective action, this study investigates how social environment influences user behavior. Corresponding to social capital, weak ties, and adoption thresholds, extrinsic motivation, communication climate and top management support are identified respectively as the main factors of member environment, group environment and organization environment that impact virtual collaboration. The research model hypothesizes that these social-level variables interact with the psychological processes related to technology use at the individual level. The survey results from virtual teams provide supporting evidence to most hypothesized relationships. The findings yield some interesting theoretical and practical implications for the collaborative use of social information systems.

1. Introduction

Mobile social media like WhatsApp and WeChat are emerging social information systems that influence different aspects of people's life [11, 34]. Developed and hosted by Tencent in China, WeChat alone has about one billion global monthly active users who enjoy versatile services such as instant messaging, moments, voice/video call, file sharing and location exploration (http://en.wikipedia.org/wiki/WeChat). The latest WeChat user and business ecosystem report indicates that 80% of the 889 million users in China have completed office work with it (e.g. notification, communication, and coordination) and close to 60% of metropolitan users regularly conduct job coordination, suggesting that professional relations have become a vital part of user network [31]. Such social information systems are very popular collaboration tools for project team members to work together through multimedia and multimodal communication [17]. In organizations,

they greatly facilitate the virtual collaboration among employees anywhere and anytime [5].

Users of mobile social media maintain contact groups for different purposes. Employees typically include co-workers under the groups of colleagues. Whenever there is a need to communicate with each other over a distance, they send one-to-one or one-to-many messages. In this way, employees at different places can work together, leading to virtual collaboration [24]. The communication among group members for information sharing and exchange lays the foundation for task collaboration, which involves commitment and trust. The working groups in virtual collaboration, or virtual teams, can be formal or ad hoc [18]. Also, a virtual team can comprise members from one organization or multiple organizations. The use of mobile social media allows employees to overcome physical and organizational boundaries to achieve bigger goals [13].

Compared with the personal use of social information systems, the collaborative use varies from one group context to another. What motivates this study is to understand the underlying mechanisms. Based on the theory of self-interest and collective action, this study attempts to include the social environment in the investigation of user behavior in virtual collaboration. The research question is: how social environment affects group member participation using social information systems? It identifies the factors at different levels of social environment, and examines how they influence user behavior. The hypothesized relationships will be tested with the multilevel analysis on survey observations from multiple organizations. The findings may provide interesting theoretical and practical implications for the collaborative use of social information systems.

2. Research background

The extent to which employees use mobile social media greatly affects communication effectiveness within groups and beyond [4, 37]. Meanwhile, individuals' use of mobile social media is under the influence of others at different levels. For instance,

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members of a group are more likely to engage in virtual collaboration when they show care and encouragement with each other through mobile social media. Also, organizations may provide incentive and support in various forms for employees to actively use the technology.

Compared with traditional information systems, the collaborative use of social information systems encounters unique opportunities and challenges. Yet researchers still examine the adoption of mobile social media mostly at the individual level [14, 30, 48, 50]. The diffusion of such social information systems in organizations, however, is under the influence of more complex environment. Thus the understanding of user behavior based on frameworks like technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT) is not sufficient. User behavior does not just depend on the utilitarian considerations such as usefulness and ease-of-use. The gap between behavioral intention and actual usage is also wider because it not only concerns how strong-willed an individual is but also involves the interactions among multiple players.

For a better understanding of how employees use social information systems like mobile social media for virtual collaboration, it is necessary to look into the interplay between by individual technology use and team task collaboration. The theory of self-interest and collective action provides an appropriate theoretical lens as it establishes a connection between individual behavior and group context [40]. In particular, it posits that individuals would rather contribute to knowledge and innovation diffusion in a network than just taking a free ride for the considerations of social capital, weak ties, and adoption thresholds [44].

Social capital refers to the relationships among people in a network characterized by reciprocity, trust, and cooperation for a common good [9]. It is the source of benefits from team collaboration, in contrast to the simple aggregation of individual efforts. The enhancement of task performance from social capital eventually turns into the rewards (e.g. positive evaluation, pay raise, promotion) that motivate team members to participate in the virtual collaboration.

Compared with strong ties based on relationships and friendships, weak ties concern acquaintances who know each other; yet weak ties carry more knowledge and innovation diffusion through than strong ties [20]. This is due to the fact that "weak ties provide people with access to information and resources beyond those available in their own social circle" (p. 209) [21]. In a virtual team, the strength of weak ties is consistent with the effort of members to establish an open and flexible atmosphere for better communication.

Adoption thresholds pertain to the proportion of technology adopters that constitute the critical mass necessary for widespread collective use within a population [45]. In virtual teams, the adoption thresholds of social information systems like mobile social media largely rely on organizational guidance and support. Members are usually happy and more productive if the management encourages them to use a popular system like WeChat for work. Yet some organizations discourage or even forbid their employees to use social information systems during working hours [1]. Thus, organizational policy from the top management may make a huge difference in adoption thresholds among virtual team members.

Known to shape human behavior, social environment concerns the people and institutions that individuals interact with [49]. Based on the theory of self-interest and collective action, therefore, social capital, weak ties and adoption thresholds can be regarded as the mechanisms embedded in the social environment that regulate team members' use of social information systems for virtual collaboration.

3. Conceptual framework

As shown in Figure 1, individual usage of mobile social media comprises two stages: 1) the formation of behavioral intention, and 2) the conversion from intention to actual usage. The first stage has been more extensively examined than the second stage in technology acceptance research (e.g. TAM). The focus of this study is to investigate how the social environment of virtual collaboration influences individual usage of mobile social media at both stages.

The part of social environment that mainly affects the intention formation stage is member environment. It contains external incentives in form of potential rewards from positive team performance based on social capital. They motivate an employee to use mobile social media for virtual collaboration. Externally oriented, this kind of extrinsic motivation is different from intrinsic motivation that is related to the enjoyment from a behavior itself [39]. Together, the two aspects of motivation influence individual behavior (i.e. behavioral intention in this case) that is relatively independent of the social interactions with others [12].
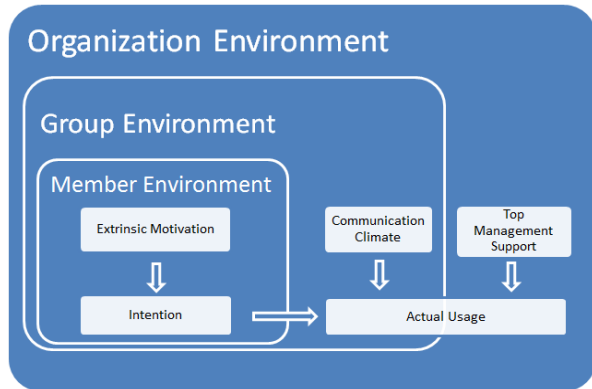
Figure 1. Social environment hierarchy

As virtual collaboration occurs in a group context, the strength of weak ties depends on whether team members encourage and support each other through mobile social media. Such a communication climate is an important aspect of group environment that affects how smooth mediated communication processes are [46]. Even if some team members are ready to contribute ideas, they may be hesitant to do so if the group has an unfriendly communication climate. In this sense, communication climate mainly makes a difference in the actual usage of mobile social media.

Employees not only communicate with each other within a team but also interact with other teams under the coordination of management. In addition, executives may provide necessary support for technology use such as resource provision, change management and vision sharing [16]. Such a top management support is necessary for virtual teams to overcome adoption thresholds for effective mediated communication among all the members. Like group environment, this form of organization environment facilitates or hinders the actual usage of mobile social media for virtual collaboration.

Together, member environment, group environment, and organization environment form the social environment for virtual collaboration. The elements at different levels motivate, encourage, and support the use of mobile social media. In particular, extrinsic motivation, communication climate and top management support yield within-, between- and beyond-member influences on the whole process from intention formation to actual usage.

4. Research hypotheses

The discussion on the social environment of virtual collaboration lays the foundation for the research model as shown in Figure 2. In the model, there are two levels: individual level and social level. At the individual level, the fundamental question is: what are the psychological processes underlying employee adoption and usage of mobile social media? Thus this part is based on the core of technology acceptance model (TAM) in which perceived usefulness and perceived ease-of-use predict behavioral intention. Mobile social media is useful to employees for both instant messaging and social networking functions that allow them to overcome temporal, geographical, and organizational boundaries in keeping in touch with each other [8, 33]. Greatly improving the efficiency of communication, mobile social media is also very easy to use with user-friendly interfaces [15].

H1: Perceived usefulness has a positive linear relationship with behavioral intention.

H2: Perceived ease-of-use has a positive linear relationship with behavioral intention.
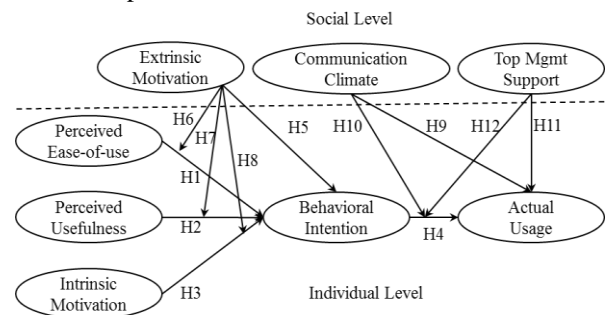

Figure 2. Research model

In addition to utilitarian considerations, the use of mobile social media brings user hedonic values as the social interactions often lead to comfort and enjoyment [41]. To accommodate such an internal drive, intrinsic motivation can be included as an additional predictor of behavioral intention concerning such technologies [47]. Compared with the extrinsic motivation in the social environment, intrinsic motivation is purely individual-specific. By nature, some people enjoy social interactions more than others.

H3: Intrinsic motivation has a positive linear relationship with behavioral intention.

In the original TAM framework, behavioral intention predicts actual usage [10]. Yet in many empirical studies, actual usage is often not included or over-simplified (e.g. yes or no). Nevertheless, the findings suggest a positive relationship between behavioral intention and actual usage of social media [38]. For virtual collaboration, how employees actually use mobile social media concern both scope and frequency. If an employee intends to communicate with others through the tool, the person is likely to use it for a variety of purposes whenever there is a need.

H4: Behavioral intention has a positive linear relationship with actual usage.

Once individual-level relationships are established, it is possible to investigate the more intriguing question at the social level: how social environment exerts influences on psychological processes? Social environment factors include extrinsic motivation, communication climate and top management support, which affect individual usage in similar but different ways. There are two possible routes that a social-level variable may exert influences: a direct effect on an outcome variable and a moderating effect on the relationships between the outcome variable and its antecedents. Though the direct effect is required to control for the moderating effect in statistical modeling, they have different meanings in theory [3]. A direct effect indicates causation between a social-level variable and an individual-level outcome variable, but a moderating effect suggests the interaction between the former and an antecedent of the latter. An environmental variable typically implies a pre-configured condition (similar to gender for example) that justifies its moderating effect.

Mainly concerning behavioral intention, extrinsic motivation has both direct and moderating relationships with it. When an employee is motivated by external incentives, the individual is more likely to form behavioral intention [28]. Meanwhile, it is expected that different levels of extrinsic motivation will strengthen or weaken the relationships between behavioral intention and its antecedents. A motivated employee is more likely to appreciate the functionality, user-friendless and enjoyment associated with mobile social media in virtual collaborating.

H5: Extrinsic motivation has a positive linear relationship with behavioral intention.

H6: Extrinsic motivation moderates the relationship between perceived usefulness and behavioral intention.

H7: Extrinsic motivation moderates the relationship between perceived ease-of-use and behavioral intention.

H8: Extrinsic motivation moderates the relationship between intrinsic motivation and behavioral intention.

Communication climate is important to team functioning as it facilitates member collaboration, enhances group identification, and improves job satisfaction [43, 2]. In computer-mediated communication, therefore, a constructive communication climate positively affects knowledge sharing and related communication among employees [46]. In a good communication climate, team members are also more likely to turn intention into actual behavior regarding the use of mobile social media for better results of virtual collaboration.

H9: Communication climate has a positive linear relationship with actual usage.

H10: Communication climate moderates the relationship between behavioral intention and actual usage.

Executive involvement and participation have a direct impact on organizing IT use by providing necessary resources, strategic guidance, and managerial support [25, 16]. Virtual collaboration is not only limited to internal communication within a group, but often also involves peer teams, external customers and other stakeholders. The facilitation and coordination of senior managers further convince employees of the use of mobile social media for such purposes.

H11: Top management support has a positive linear relationship with actual usage.

H12: Top management support moderates the relationship between behavioral intention and actual usage.

5. Methodology

To test the research hypotheses, observations on the variables in question were collected with a survey on organizations in which employees use mobile social media for virtual collaboration. Most measurement items were adapted from validated instruments from previous studies. Perceived usefulness, perceived ease-of-use and behavioral intention were measured with items adapted from the TAM instrument [10]. The measures of actual usage were based on the items to capture the frequency and scope of social media use [19]. Intrinsic motivation and extrinsic motivation measures were adapted from [41]. Communication climate items were based on [17]. Top management support was measured with items adapted from [25, 36]. All measures were of 5-level Likert scale.

In China, WeChat is the most popular mobile social media, and over 90% smartphone owners in China actively use it [42]. Many organizations let employees use WeChat to communicate and work with each other for various projects. The survey questionnaires were distributed to 450 employees in 45 organizations. At the end, there were 376 valid responses from 36 organizations (organizations with 5 or fewer responses were excluded). When possible, face-to-face, and telephone and instant messaging interviews were conducted with some of the participants after the survey on their personal experiences of using WeChat in virtual collaboration.

Each participant might work on multiple projects, and was asked to respond to the questions based on the most recent experience. As there are overlaps in virtual team assignments, it is impossible and improper to divide participants into mutually exclusive groups. The

mingling of membership suggests that virtual teams in each organization share similar characteristics.

In the final sample, there were 174 females (46.3%) and 202 males (53.7%). Most of the participants were 35 or younger (86.7%), and received higher education (93.6%). The majority of organizations were small or medium enterprises (55.6%), whereas the others had more than 1000 employees. They were from different industries, including manufacturing, real estate, IT, education, research and services.

To test the research hypotheses involving both individual- and social-level variables, this study adopts the statistical method of hierarchical linear modeling (HLM). Considering the influences of within-subject and between-subject variances simultaneously, HLM handles direct and interaction effects of predictors at different levels on each individual-level outcome variable. The main statistical software used was HLM 6.02.

To assess the common method bias, Harman's one-factor test was conducted [35]. The exploratory factor analysis on all the variables did not suggest that any single factor accounted for the majority of shared variance. Thus, the common method bias is not a major concern in the data. To further reduce the influence of multicollinearity, group mean centering was performed on all predictors at the individual level and grand mean centering was performed on all predictors at the social level before conducting the HLM analyses.

6. Results

To assess the reliability of responses for each construct, Cronbach's alpha was obtained: Perceived Usefulness (0.937), Perceived Ease-of-use (0.895), Behavioral Intention (0.901), Actual Usage (0.702), and Intrinsic Motivation (0.953). All the values were above 0.7, indicating acceptable internal consistency. Furthermore, Tables 1 and 2 report the exploratory factor analysis (EFA) results to evaluate factorial validity. There is supporting evidence for both convergent and discriminant aspects as all the factor loadings were above 0.6, and the smallest factor loading was greater than the largest cross-loading in each table [23, 7].

Before testing the research model, it is necessary to assess the validity of multilevel analysis. Indicating the percentage of individual response variability due to grouping, intra-class correlation (ICC(1)) coefficients were obtained [6]. They were 0.247, 0.126, 0.260 for Extrinsic Motivation, Communication Climate, and Top Management Support, respectively. Based on ANOVA, the shared variance among the participants from the same organizations was also significant for

Extrinsic Motivation (F =4.429, p <0.001), Communication Climate (F =2.512, p <0.001), and Top Management Support (F =4.674, p <0.001). Also, the aggregated values of these variables at the social level exhibited good level of reliability as indicated by ICC(2) (0.774 for Extrinsic Motivation, 0.602 for Communication Climate, and 0.786 for Top Management Support) and $r_{wg(j)}$ (0.846 for Extrinsic Motivation, 0.928 for Communication Climate, 0.919 for Top Management Support) larger than 0.7 [26].

Table 1. Individual-level factor loadings

Items	PU	IM	PE	AU	IN
PU1	**.861**	.165	.203	.122	.073
PU2	**.894**	.161	.185	.127	.002
PU3	**.896**	.165	.205	.051	.098
PU4	**.811**	.176	.313	.042	.115
PE1	.202	.036	**.835**	.008	.075
PE2	.383	.236	**.674**	.094	.150
PE3	.250	.109	**.885**	.061	.007
PE4	.270	.090	**.879**	.041	-.019
IM1	.315	**.874**	.128	.093	.098
IM2	.246	**.906**	.139	.080	.121
IM3	.289	**.890**	.133	.087	.138
IN1	.466	.364	.171	.241	**.622**
IN2	.376	.430	.112	.161	**.665**
IN3	.496	.357	.162	.168	**.684**
AU1	.204	.098	.077	**.855**	.125
AU2	.298	.222	.118	**.767**	.111

Note: PU – Perceived Usefulness; IM – Intrinsic Motivation; PE – Perceived Ease-of-use; AU – Actual Usage; IN –Intention.

Table 2. Social-level factor loadings

Items	TMS	EM	CC
EM1	.334	**.700**	.276
EM2	.313	**.876**	.212
EM3	.298	**.905**	.132
EM4	.277	**.909**	.134
CC1	.178	.142	**.864**
CC2	.190	.100	**.828**
CC3	.254	.273	**.743**
CC4	.198	.132	**.816**
TMS1	**.639**	.213	.435
TMS2	**.784**	.224	.236
TMS3	**.814**	.328	.171
TMS4	**.783**	.344	.195
TMS5	**.761**	.349	.150
TMS6	**.820**	.175	.216

Note: TMS – Top Management Support; EM – Extrinsic Motivation; CC – Communication Climate.

Before testing the hypothesized relationships, it is necessary to assess whether there was substantial between-group variation in behavioral intentional and actual usage at the individual level with respective null models. The mean of behavioral intentional was 3.93 (γ_{00}, $t = 59.78$, p < 0.001), with significant between-group variance ($\sigma^2_{U0} = 0.12$, p < 0.001). The mean of actual usage was 3.66 (γ_{00}, $t = 37.95$, p < 0.001), with significant between-group variance ($\sigma^2_{U0} = 0.23$, p < 0.001). The salient between-group influences justified the testing of multi-level models.

Table 3 reports the results with behavioral intention as the predicted variable. Model 1 includes perceived usefulness, perceived ease-of-use, and intrinsic motivation as predictors, controlling organization size as well as participant age, education and education. All predictors were highly significant, supporting H1, H2 and H3. The between-group variance component was highly significant (σ^2_{U0}=0.15, $\chi^2 = 399.2$, $p < 0.001$), justifying the inclusion of higher-level variables [29]. The intercept-as-outcome Model 2 tested the direct effect of extrinsic motivation, which was positive and highly significant, supporting H5. Organizational size as the control variable at the social level was also positively significant. Bigger organizations seem to provide more external incentives for employees to use mobile social media. The slope-as-outcome Model 3 tested the moderating effects of extrinsic motivation, which were negative for perceived usefulness, insignificant for perceived ease-of-use, and positive for intrinsic motivation. Thus, H6 and H8 were supported.

Figure 3 illustrates the moderating effects of extrinsic motivation. At its higher level, perceived usefulness and intrinsic motivation exhibited weaker and stronger effects on behavioral intention, respectively, whereas the slope of perceived ease-of-use remained about the same. When external incentives were strong, whether the mobile social media is perceived useful or not did not matter as much, but the effect of intrinsic motivation got magnified.

Table 4 reports the results with actual usage as the predicted variable. Model 1 included the predictor of behavioral intention, with organization size as well as participant age, education and education as control variables. The predictor was highly significant, supporting H4. The between-group variance component was also highly significant (σ^2_{U0}=0.27, χ^2 131.65, $p < 0.001$), which allows the subsequent

models to include variables at the social level. Models 2 and 3 tested the direct and moderating effects of communication climate, but only the former (H9) was supported. Models 4 and 5 further tested the direct and moderating effects of top management support, and both (H11 & H12) were supported.

Table 3. Predicting behavioral intention

Fixed effects	Model 1	Model 2	Model 3
For intercept(β_{0j})			
intercept(γ_{00})	3.91***	3.91***	3.91***
Org_size(γ_{01})	.05	.09**	.09**
EM (γ_{02})		.54***	.58***
For Gender(β_{1j})			
intercept(γ_{10})	.01	.02	.01
For Age(β_{2j})			
intercept(γ_{20})	.02	.02	.02
For Education(β_{3j})			
intercept(γ_{30})	-.01	-.01	-.01
For PU slope(β_{4j})			
intercept(γ_{40})	.37***	.37***	.36***
EM (γ_{41})			-.28**
For PE slope(β_{5j})			
intercept(γ_{50})	.15**	.14**	.15**
EM (γ_{51})			.08
For IM slope(β_{6j})			
intercept(γ_{60})	.30**	.31**	.31**
EM (γ_{61})			.24**
Random effects			
Intercept(U_{0j})	.15***	.05***	.05***
PU slope(U_{1j})	.13***	.14***	.11***
PE slope(U_{2j})	.04**	.04**	.04**
IM slope(U_{3j})	.11***	.12***	.10***
Level-1(e_{ij})	.13	.13	.13
Deviance	486.75	456.97	462.53

Note: PU – Perceived Usefulness; IM – Intrinsic Motivation; PE – Perceived Ease-of-use; EM – Extrinsic Motivation.

Figure 4 illustrates the moderating effects of communication climate and top management support. Compared with communication climate, top management support exhibited a much stronger moderating effect. At a higher level of top management support, the relationship between behavioral intention and actual usage was also stronger.
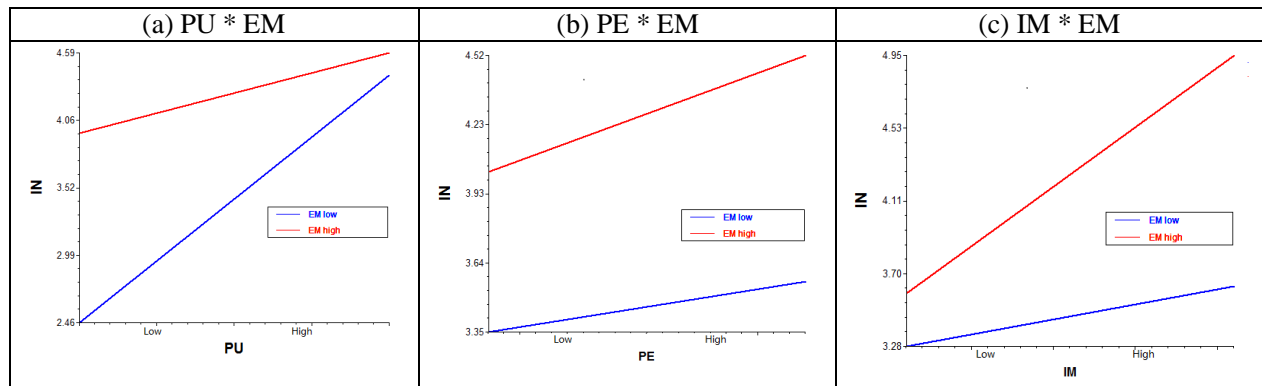
(a) PU * EM	(b) PE * EM	(c) IM * EM

Figure 3 Moderation effects of extrinsic motivation

Table 4. Predicting actual usage

Fixed effects	Model 1	Model 2	Model 3	Model 4	Model5
For intercept(β_{0j})					
intercept(γ_{00})	3.67^{***}	3.67^{***}	3.67^{***}	3.67^{***}	3.66^{***}
Org_size(γ_{01})	.03	.01	.01	.06	.06
CC(γ_{02})		$.55^{*}$	$.55^{*}$	-.46	-.45
TMS(γ_{03})				1.12^{***}	1.12^{***}
For Gender(β_{1j})					
intercept(γ_{10})	-.03	-.05	-.05	-.04	-.03
For Age(β_{2j})					
intercept(γ_{20})	-.10	-.10	-.10	-.09	-.10
For Education(β_{3j})					
intercept(γ_{30})	.07	.06	.06	.07	.06
For IN slope(β_{4j})					
intercept(γ_{40})	$.76^{***}$	$.76^{***}$	$.76^{***}$	$.75^{***}$	$.78^{***}$
CC (γ_{41})			-.02		-.32
TMS (γ_{42})					$.32^{*}$
Random effects					
Intercept(U_{0j})	$.27^{***}$	$.25^{***}$	$.25^{***}$	$.06^{***}$	$.06^{***}$
Intention slope(U_{1j})	.01	.01	.01	.00	.00
Level-1(e_{ij})	.89	.89	.89	.90	.89
Deviance	1085.33	1081.18	1083.78	1058.66	1058.22

Note: TMS – Top Management Support; EM – Extrinsic Motivation; CC – Communication Climate; IN –Intention.

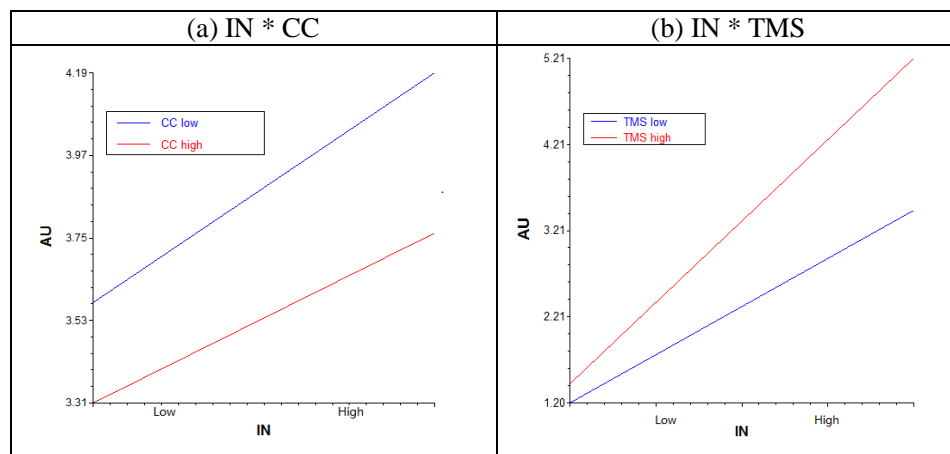| (a) IN * CC	(b) IN * TMS

Figure 4 Moderation effects of communication climate and top management support

7. Conclusion and implications

Based on a systems perspective, this study investigates how the social environment of virtual collaboration affects employees' use of mobile social media. It identifies member environment, group environment and organization environment in a hierarchy, and hypothesizes how the major element in each makes a difference in individual usage. The findings confirm the interactions between social-level factors and individual-level psychological processes in the collaborative use of social information systems. In particular, extrinsic motivation in the member environment has a direct impact on behavioral intention and interacts with its antecedents in different ways. It is the positive moderator for intrinsic motivation but the negative moderator for perceived usefulness. Communication climate in the group environment only boosts up actual usage, whereas top management support in the organization environment had an additional moderating effect to strengthen the relationship between behavioral intention and actual usage.

This study has limitations. There is only one mobile social media platform under investigation, and all observations used in empirical analyses were collected from a single country. WeChat is the most popular mobile app in China, and the sample gathered excludes certain extraneous factors due to the differences in technological characteristics and cultural influences. Yet the generalizability of specific findings is questionable in terms of whether the findings can be extended to other settings. In future studies, observations may be collected from the users of different mobile social media platforms (e.g. WhatsApp) in other countries.

Despite the limitations, the findings yield some interesting theoretical and practical implications. First of all, the conceptualization of social environment provides a theoretical framework to examine user behavior concerning social information systems. Compared with traditional information systems, human communicative and collaborative activities through the mediation and facilitation of such systems are embedded in social contexts. Though there is considerable literature about the impact of organizational climate as the "facilitating condition" on technological innovation adoption [27], an information system is mostly treated as an object to be accepted or rejected. The emergence of social information systems like mobile social media, however, brings social environment itself into the equation. The elements at its different levels affect not only behavioral intention but also the scope and frequency of actual usage. This study extends technology acceptance research by adding another layer of social environment on top of individual usage.

At the individual level, behavioral intention is mostly determined by utilitarian and hedonic considerations, including perceived usefulness, perceived ease-of-use and intrinsic motivation. At the social level, factors like extrinsic motivation, communication climate and top management support further condition the whole process from user perceptions to actual usage.

Compared with perceived usefulness, extrinsic motivation is closely related to social capital of virtual collaboration rather than the tool itself. One participant mentioned in the interview that "The use of WeChat is helpful for my performance in the team: I will not miss important updates but rather be available when others need me." In this study, extrinsic motivation is found to suppress the effect of perceived usefulness with negative moderation. On the contrary, it positively moderates the relationship between intrinsic motivation and behavioral intention. The separation between two types of motivation at different levels provides additional insights regarding the interaction between them.

On the other hand, the findings confirm that top management support moderates the relationship between behavioral intention and actual usage. One participant said: "During working hours, I do not feel nervous using WeChat for job-related issues as it is encouraged by my supervisors," and another mentioned: "Our company regularly organizes training on WeChat to ensure that everyone can use the existing and emerging functions." Once adoption thresholds are largely removed, it is less a question of whether employees use WeChat or not, and more of the extent to which they use it (e.g. frequencies, occasions, functions).

Similarly, communication climate may make a difference in the actual usage. A participant said: "We are always friendly, helpful and professional when communicating with each other using WeChat. After all, we are working toward the same goal. Sometimes, we continue discussions after work". Yet, the moderation effect was found insignificant in this study. One explanation is that there is a lack of variation in its responses in comparison to top management support (standard deviations: 0.306 vs. 0.482). For the strength of weak ties, team members tend to be positive and accommodating in virtual collaboration. However, organizations vary drastically in their policies regarding WeChat use in work from backing to prohibition.

From a practical point of view, the findings provide helpful insights on the best practices

regarding the utilization of mobile social media in organizations. Managers should be aware that in today's business atmosphere, the use of personal social information systems like WeChat and WhatsApp in employees' work lives is almost inevitable. Although some studies found that these systems may bring some negative effects such as distraction [32, 22], they can become an asset leading to competitive advantage if the employees are provided guidance and support in the collaborative use. Rather than resisting the technology, managers should have more open attitude and encourage its use in virtual teamwork, inter-organization coordination and intra-organization communication.

As the champions for organizational innovations and strategies, senior managers influence the behavior of employees through policy making and resource provision. In particular, they may encourage work groups and team leaders to build and create open and constructive communication climate, which leads to better outcomes of virtual collaboration. In addition, it is necessary for organizations to give appropriate incentives to strengthen the external motivation of employees.

8. Acknowledgments

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