SOCIAL CAPITAL, SENSE OF VIRTUAL COMMUNITY, AND NETWORK GROUP BEHAVIOR: AN EMPIRICAL STUDY BASED ON VIRTUAL COMMUNITY USERS

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Social Capital, Sense of Virtual Community, and Network Group Behavior: An Empirical Study based on Virtual Community Users

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Abstract

Existing studies on the relationship between social capital and group behavior generally use social capital theory to explain and analyze the causes of group behavior in traditional community. However, the uniqueness of group behaviors in the network scenario determines that the influences of social capital on network group behavior are different from those on actual group behavior to a certain extent. Therefore, systematic explanations are necessary for the exploration of the action mechanism of network group behavior at the social capital level. To explore influencing factors of network group behavior and thereby obtain corresponding solutions, the study constructed a hypothesis model of social capital-sense of virtual community-network group behavior on the basis of social capital theory. The relationship among social capital, sense of virtual community, and network group behavior was verified by structural equation model using the investigation data of 408 active users from three famous interest-type virtual communities (Tianya Community, Mop Community, and Baidu Tieba) obtained from March 2017 to April 2017. Results show that social capital not only directly influences network group behavior but also indirectly influences network group behavior through the mediation of sense of virtual community. The members of virtual community groups who have high social capitals actively participate in group behaviors. The improvement of group members with regard to participation in group behaviors is mainly benefited from mutual trust, commitment, and interaction among group members. Group members' participation in group behaviors is further enhanced through the perceived sense of membership, immersion, and influence. Therefore, the influencing mechanism of social capital and sense of virtual community on network group behavior is disclosed to a certain extent. Conclusions in this study provide interventions for virtual community managers who aim to enhance the internal management of virtual community in order to encourage positive network group behaviors for further improvement in organizational effectiveness.

Keywords: social capital, sense of virtual community, network group behavior, trust, interaction, membership, immersion.

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Introduction

The development of social media platforms represented by virtual communities is conducive to the integration of groups with common interests and goals. Diversified network groups have different topics and goals in virtual communities. On the one hand, in a virtual community with "self-organization" characteristics, group members are the promulgators and creators of its contents. That is, they are the main participants of virtual communities. Exchange of ideas, information, and other resources occurs only when the members continuously interact on a community platform as the value of virtual communities can be generated (Guo, Zhang, Zhou, &Lu, 2014). Interactions among group members are evidently the key that determines the success of virtual communities. Hence, encouraging virtual community users to participate in group behaviors and to communicate, interact, and share positively is one of the critical goals of virtual communities at present. On the other hand, given the concentration and expansion of group behaviors, causing certain relevant effects is easy. Certain negative effects such as unconscious gossips and rumors may induce group violence and generate moral crisis. For instance, netizens united and stood on the moral high after the occurrence of the MH370 Malaysia Airlines incident. They blamed Malaysia Airlines and relevant departments, which became the target of public criticism in a period. Such speeches and written attacks are often accompanied with violations of moral behaviors and regulations. In this practical background, encouraging virtual community users to participate in group behaviors and guide them to communicate, interact, and share positively are one of the critical goals of virtual community management. Several strategies that encourage virtual community members to positively participate in group behaviors have been explored, so the continuous growth of virtual communities is ensured.

Currently, group behaviors have become the focus of organizational behavior research. Most researchers focused on related research from the psychological field. Relevant studies have basically agreed that the participation of individuals in actual group behavior depends on three antecedent variables, namely, group identity, group emotion, and group effectiveness (Chen, Xue, & Le, 2012). Many researchers focus on network group behavior, and some believed that social capital can directly influence network group behavior. Meanwhile, trust, shared vision, and identification considerably influenced users' participation in group behavior (Zhou & Lu, 2008). Other studies applied social capital into specific network behaviors, such as knowledge sharing (Chen & Qi, 2014), innovative behavior (Cao & Xiang, 2014), and citizen behavior (Sun, 2012). Several studies attempted to determine the internal mechanisms of the relationship between social capital and network group behavior. However, the sense of belonging and immersion of virtual community members, as well as the influences perceived by group members, are often overlooked. Compared with other factors, these perception factors deserve more attention from virtual community managers. Thus, the sense of virtual

community is used as the intermediate variable for the exploration of the influence of social capital on network group behavior under virtual community scenarios. Such a result is conducive to explain the microscopic influencing mechanism of social capital on network group behavior.

Therefore, this study aims to reveal the reasons for the participation of virtual community members in group behaviors. The influencing factors and action mechanisms of network group behavior are explored in virtual communities as well. The following problems are studied here: (1) whether the social capital of group members in virtual communities is the major influencing factor of network group behavior and (2) whether the sense of virtual community can mediate the relationship between social capital and network group behavior. How does the specific action mechanism? To address these two problems, a theoretical analysis model is constructed. The empirical test of theoretical model based on structural equation model (SEM) offers a way for virtual community managers to recognize the influencing elements and action paths of network group behavior. Corresponding suggestions are proposed for the positive network group behavior. This study attempts to expand the theoretical research field on social capital, aiming to further enrich theoretical studies of group behaviors.

Literature Review and Theoretical Hypothesis

Social capital, sense of virtual community, and network group behavior

Social capital has strong explanatory power; thus, it has been highly appreciated by scholars (Zhao & Luo, 2005). This study focuses on the virtual community scenario. First, social capital of group members in virtual communities comes from microscopic interactions (Zhuang, 2015), and social capital is a variable in the individual cognition level (Luo & Fang, 2014). Second, the virtual community scenario is somewhat different from traditional community. However, interpersonal relationship, which is maintained and expanded through virtual community, also involves abundant social capitals (Ge, Zhou, Niu, & Chen, 2016). Therefore, the three-dimensional social capital method of Nahapiet and Ghoshal (1998) is applied in the theoretical modeling and empirical research in this study.

Structural dimension of social capital

This dimension expresses the interaction frequency of the members of virtual communities. Given the frequent interaction, members understand each other well and are willing to spend time to be immersed in virtual communities (Xu, Zhang, Li, & Tian, 2016). Existing measurement studies of the structural dimension of social capital basically focus on interaction, neutrality, and equivalency. Owing to the spontaneity of network group behavior, interaction is the prerequisite for

the generation of social capital in a network relationship. This study emphasizes the interactions among network group members and measures the structural dimension of social capital by interactions. Wasko and Faraj (2005) discovered from the perspective of habit that members who maintain close relationships with other group members easily develop senses of identification and belonging to the group, thus developing a sense of membership. Membership, as a dimension of sense of virtual community, reflects the experience feelings of belonging to the virtual community (Koh & Kim, 2003). The study of Zhao, Lu, and Deng (2009) showed that the interactions among virtual community members have positive effects on the sense of virtual community. Zhang (2015) carried out an empirical study on the impacts effects of structural capital on sense of virtual community, proved the positive relationship between them and emphasized the positive effect of interaction on members' influence. Influence reflects people influence other members or their community, which is an easily perceived dimension of sense of virtual community (Koh & Kim, 2003). Moreover, Rogers and Kincaid (1981) discovered that the interactions among group members have significant effects on their participation in group behaviors. Interactions among the members of virtual communities often generate contacts through discussions. The strength of interaction affects the immersion of members in groups (Zhao, Sun, & Zhang, 2016), and immersion reflects the state in which people feel the flow of interaction (Koh & Kim, 2003). Therefore, participating in group behaviors is evidently a continuous exchange and interaction process among different group members. In this process, when the users of virtual communities are interested in the discussion contents of groups, they invest time and effort as members of the group and develop strong immersion. They confident that they can influence other members and their needs can be met as well. Hence, these users are willing to participate in group behaviors. Accordingly, the following hypotheses are proposed:

Hypothesis 1a: Structural dimension of social capital has a positive impact on the sense of virtual community.

Hypothesis 1b: Structural dimension of social capital has a positive impact on membership.

Hypothesis 1c: Structural dimension of social capital has a positive impact on influence.

Hypothesis 1d: Structural dimension of social capital has a positive impact on immersion.

Hypothesis 2: Structural dimension of social capital has a positive impact on members' participation in network group behavior.

Relational dimension of social capital

This dimension is often related to trust, commitment, and preference, according to characteristics of network groups. Xu et al. (2016) determined the role of trust and commitment on the sense of virtual community. Trust is the major factor that influences members' participation in network group behavior (Chowdhury, 2005). Ning and Zhang (2014) studied the trust problem under network environment and believed that the mutual trust among different virtual community members is gradually enhanced with the increase in the number of interactions. Riding, Gefen and Andarinze (2002) discovered that trust is the most important factor influencing the interaction among different virtual community members. Therefore, trust has also become an important factor affecting the sense of virtual communities. It enhances the sense of membership, influence and immersion. Commitment is an important component of the relational dimension of social capital. As a high-level social relation, commitment can indicate the reason that community members are happy to help others and willing to share information and resources with others (Flynn, 2005). Wasco and Farah (2000) attributed knowledge sharing and exchange among virtual community members to the commitment among them. Ellison, Vitak, Gray and Lampe (2014) believed that commitment refers to the members' tendency to respond to the requests of other users in social networks. Such tendency influences members' feelings to the virtual community group. Therefore, trust and commitment evidently encourage group members to participate in group behaviors and develop a strong sense of membership. Group members immerse themselves in interactions with other members not only to influence other members but also to meet their own needs. Such interactions enhance the emotional identifications of members. Accordingly, the following hypotheses are proposed:

Hypothesis 3a: Relational dimension of social capital has a positive impact on the sense of virtual community.

Hypothesis 3b: Relational dimension of social capital has a positive impact on membership.

Hypothesis 3c: Relational dimension of social capital has a positive impact on influence.

Hypothesis 3d: Relational dimension of social capital has a positive impact on immersion.

Hypothesis 4: Relational dimension of social capital has a positive impact on members' participation in network group behavior.

Cognitive dimension of social capital

This dimension is the resource used in the interpretation and communication in a community. Shared vision and shared language are common measurement indexes. Shared vision reflects common goals and values. Nahapiet and Ghoshal (1998) compared shared vision to a "top concept" provided to individual members.

A shared vision helps members to cognize information, which is valuable to groups from the perspective of the whole group. In the formation of groups, shared vision is similar to a rope that tightly binds members (Merlo, Bell, Mengüç, & Whitwell, 2006). Hogg and Hardie (2006) believed that virtual community members generally select groups with the same ideas and opinions to distinguish themselves from other groups. Shared language is another important reason for the continuous maintenance of social networks or none communication can be realized. Chiu, Hsu and Wang (2006) pointed out that shared language is beneficial to the sharing of ideas, knowledge, and information among different members and increases interaction efficiency. Therefore, shared vision and shared language help group members acquire information and knowledge from other members effectively, thus facilitating their sense of belonging and dependence to the group. Consequently, a sense of membership is formed. Group members with high shared vision and shared language have high tacit understanding and can develop strong influence and immersion. Hence, group members are encouraged to participate in group behaviors. Accordingly, the following hypotheses are proposed:

Hypothesis 5a: Cognitive dimension of social capital has a positive impact on the sense of virtual community.

Hypothesis 5b: Cognitive dimension of social capital has a positive impact on membership.

Hypothesis 5c: Cognitive dimension of social capital has a positive impact on influence.

Hypothesis 5d: Cognitive dimension of social capital has a positive impact on immersion.

Hypothesis 6: Cognitive dimension of social capital has a positive impact on members' participation in network group behavior.

Sense of virtual community and network group behavior

Sense of virtual community is people's experience and perception of the community in the virtual environment (Tonteri, Kosonen, Ellonen, & Tarkiainen, 2011). It is generated after the popularization of the Internet. It is mainly used for reference in the study of the relationship between the sense of community and behaviors of members. Mcmillan and Chavis (1986) epitomized the community perception field. They proposed the "four-element" theoretical model and emphasized the involvement of perceived membership, influence, integration and satisfaction, as well as connection and identification. The "four-element" theoretical model has important influences on subsequent studies, especially to the concept and measurement of sense of community. After the emergence of virtual community, researchers have started to realize the close relationship among virtual community members; they also found that communities can encourage participation

in activities, result in close community cooperation, and transfer offline activities to online (Koh & Kim, 2003; Blanchard & Markus, 2004). To assure stable and continuous development of the virtual community and maintain adequate member population, virtual community managers must cultivate members' sense of belonging, identification, and dependence to virtual communities (Cao, 2015). To discuss the dimension of sense of virtual community, Koh and Kim (2003) used two (e.g., membership and influence) of the four dimensions as one part of the sense of virtual community for the first time and introduced them into the virtual community scenario. They believed that virtual communities have certain features that are different from those of traditional communities. For instance, the anonymity, immersion behavior, and voluntary participation behavior can be expressed by the sense of immersion. Therefore, they introduced immersion into the dimension of sense of virtual community. They proposed that sense of virtual community covers a total of three dimensions, namely, membership, influence, and immersion. Later, many scholars studied the dimensions of the sense of virtual community on the basis of different theories (Ellonen, Kosonen, & Henttonen, 2007; Tsai, Joe, Lin, Wang, & Chang, 2012; Xu et al., 2016). Although previous studies have different antecedent variables and theoretical bases, dividing dimensions of sense of virtual community into membership, influence, and immersion is reasonable and comprehensive. Such a division has been examined by many scholars and has basically been recognized by the academia.

First, membership is mainly manifested by sense of belonging. In their studies on network community, Koh and Kim (2003) emphasized that virtual community should be centered at the membership. Zhao, Lu and Deng (2009) believed that the strong sense of virtual community can enhance the participation of users in virtual communities. By studying the psychology of virtual community members, sense of identification and membership, which are gained by virtual community members, can influence the participation of the members in group behaviors (Zhao, 2006). Moreover, when individuals perceive belonging to a specific community group, they become aware of the significance of the emotions and values that other members bring to them (Blanchard & Markus, 2004; Cao, 2015). Members who have a strong sense of belonging to the group have strong cohesion (Wang, Wu, & Wang, 2016). Therefore, they are willing to spend more time in participating in group behaviors. The participation degree increases with the increase of participation level, which can facilitate the subsequent participation behaviors of the members.

Second, influence refers to members' influences on other members and perception influences from other group members. When a member has enough influence in the group, he or she is viewed deeply participating in group behaviors. Wasko and Faraj (2000) discovered that people participate in group behaviors in virtual communities as a response to moral responsibility except when gaining practical benefits or intangible returns, thus bringing them certain influences in the community. When community members recognize their important position and

influence in the group, they develop a strong social responsibility and participate in group behaviors, aiming to form strong influences and realizing the consistent group goal. Koh and Kim (2003) also believed that the immersion and influence generate from members' participation in network behavior could deepen their participation in group behaviors. Zhang (2015) studied the relationships between the influence of members and the participation in group behaviors, finding that such an influence has positive effects on members' participation in group behaviors. Therefore, it is to be believed that influence is positively related with participation level in group behaviors. When members perceive their influences on other members, their participation in group behavior will increase accordingly. This condition increases the possibility of subsequent participation.

Third, immersion is an addiction state that filters all uncorrelated cognitions automatically. When people are absorbed in an ongoing activity, they are often immersed in it; their perceptions are controlled by their environment (Hsu & Lu, 2004). Hatris and Goode (2004) discovered that group members of virtual communities are often immersed in discussions about a common topic, answering questions of other members, and sharing information and resources. Gao and Bai (2014) reported similar studies. They deemed that the flow experiences of virtual community members in interactions make members participate in group behaviors continuously and repeatedly. Chang and Zhu (2012) emphasized that immersion influences the willingness of the continuous uses of social network. Similar studies have been reflected in group behaviors of WeChat users. Owing to various pressures in the practical world, opinions which cannot be expressed in practical life may be represented on network. Hence, participation in group behaviors in the social network is a kind of flow experiences, and it is one of the key causes of network group behavior (Shi, 2016). Therefore, group members take time to understand group goals and behaviors during interaction, thereby developing immersion experiences gradually. These experiences deepen participation in group behaviors. Accordingly, the following hypotheses are proposed.

Hypothesis 7: Membership has a positive impact on members' participation in network group behavior.

Hypothesis 8: Influence has a positive impact on members' participation in network group behavior.

Hypothesis 9: Immersion has a positive impact on members' participation in network group behavior.

Network group behavior

Based on Du and Wei's (2010) definition of network group behavior, this study proposes that network group behavior is a kind of individual behavior under common emotions. Individuals are stimulated by certain factors about hot events, and participate in online gathering, which is characterized by the strengthening and convergence of opinions.

The academic circle has recently reached a uniform understanding on the characteristics of network group behavior, such as the strengthening and convergence of opinions. That is to say, the aggregation effect of network group behavior is emphasized (Du & Wei, 2010). Certain enlightenments are provided to understand how group behaviors are generated and which factors can influence them. Psychological studies on the generation mechanism of group behaviors have achieved the most important results (Van, Postmes, & Spears, 2012). Viewed from the psychological perspective, scholars have basically agreed that group identity, group emotion, and group effectiveness encourage individuals' participation in group behaviors and hasten the development of two-path models centering at these three antecedent variables. The two-path model of "group anger and group effectiveness" proposed by Van, Spears, Fischer and Leach (2004) possesses high theoretical level. The model attracts subsequent studies to pay attention to how group effectiveness guides the result rationality of group behaviors, how group identity guides the process rationality of group behaviors. These studies lay psychological analysis bases to study the relationship between social capital and network group behavior.

Although studies on network group behavior have achieved great progresses in the psychological field, most still linger on the qualitative study. Studies that combine qualitative and quantitative analyses based on management or sociology theory are rare because of the complexity of group behaviors (e.g., free constraint and anonymity). The complexity of its measurement is also determined. At present, the most extensive measurement method is to inquire respondents' attitude about participating in group behaviors or willingness to participate in them (i.e., how much a volunteering activity is supported) on the basis of certain conditions (Mackie, Devos, & Smith, 2000). Other scholars measured the actual group behavior under allowable conditions, for instance, using the participation in certain volunteering activities as the standard (Van et al., 2004). In this study, considering the difficulties in acquiring group behaviors in virtual communities, the corresponding behavioral intention is selected as the proximal variable. The behavioral intention of group members is acquired by organizing interviews and designing background cases. Participation of group members in network group behavior is divided into participation degree, participation level, and continuous participation.

Participation degree

Zhao (2006) defined the participation degree of virtual community members as the intensity of topic participation, including complete non-participation, passive participation, weak participation, positive participation, strong participation, and complete participation. Zhen (2013) classified participation degree according to netizen density and group emotion. In this study, the participation degree of network group behavior is defined as the strength of members' participation in

group behaviors. Based on netizen density and group emotion, participation degree is divided into loose-relaxation, loose-tense, dense-relaxation, and dense-tense types. These types are used as references for the questionnaire design related with participation degree in network group behavior.

Participation level

Considering the participation level of members in group behaviors, Valck, Van and Wierenga (2009) investigated the virtual community participation behaviors of individuals and classified them according to the participation level. In this study, the classification of network groups is analyzed from the perspectives of "demand-motive-behavior." It is to be believed that subjective demands of members motivate them to participate in group behaviors. The classified network groups are divided into emotional release members, positive spreading members, common participants, and information browsers. They are used for designing questionnaires related to participation level in network group behaviors.

Continuous participation

Continuous participation refers to the continuous behaviors of virtual community members，from the perspective of individual participation frequency and duration in group interaction. Based on the definition of group participation as the "existence," Fang and Derrick (2008) further defined continuous participation in virtual communities as "existence time," in which individuals participate in group interactions. Guinea and Markus (2009) emphasized that emotional factors（e.g., satisfaction and other emotional factors）rather than cognitive factors are the important causes that render group members to continuously participate. Deng (2013) emphasized that continuous participation is an important condition for survival and development of virtual communities.

Based on the theoretical analysis and hypotheses, the following theoretical analysis model of relationship among social capital, sense of virtual community, and network group behavior is constructed preliminarily (*Figure 1.*).
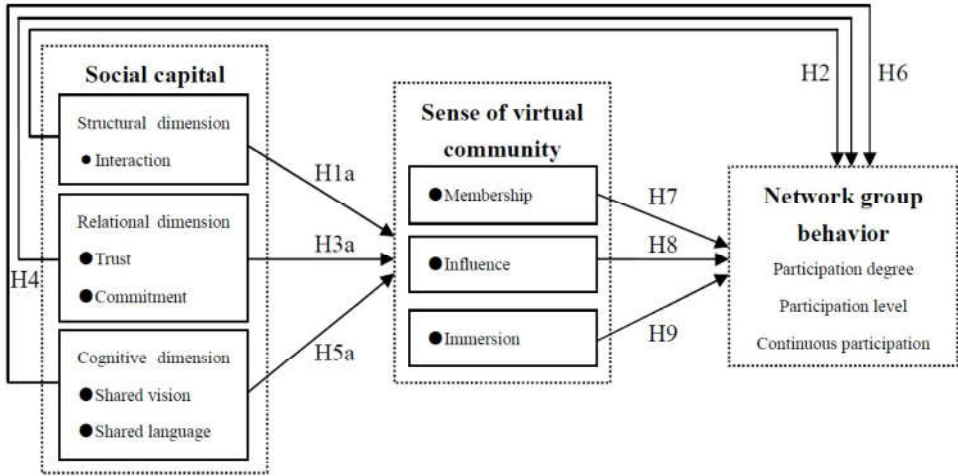
Figure 1. Proposed Model of Theoretical Analysis

Methodology

Sampling and data acquisition

In this study, data were acquired by questionnaire survey. Considering the virtual community scenario, it had to assure that respondents had experiences in using virtual communities. Active users of the three famous interest-type virtual communities, namely, Tianya Community, Mop Community, and Baidu Tieba, were used as the respondents. Questionnaires were issued online through these three virtual communities. A total of 600 questionnaires were sent from March 2017 to April 2017, and 535 questionnaires were collected effectively. They were reviewed according to completeness and standards of answering, and 127 invalid questionnaires (blank questionnaire, missing data, contradictory data, and data polarization) were eliminated. The remaining 408 questionnaires were effective, which met the requirements on sample size (Wu, 2013). Hence, it can be considered that the sample size meets the requirements of descriptive statistical analysis, correlation analysis and SEM analysis.

Scale design

According to the principle of authority and applicability, relevant questionnaire scales were reviewed. By combining the characteristics of virtual community, this study designed the scales of social capital, sense of virtual community,

and network group behavior. All the questionnaire scales were filled in a small range before the formal test. Items with poor expressions and difficult to be understood were corrected. The final formal questionnaire was formed. The social capital scale, which belongs to individual cognitive level, mainly refers to the three-dimensional measurement scale of Nahapiet and Ghoshal (1998), the social capital measurement scale of Mcfadyen and Cannella (2004), Luo, Zhen and Xie (2007). The scale was adjusted and revised according to actual situations in virtual communities. The scale covered the structural, relational, and cognitive dimensions of social capital. The scale of the structural dimension of social capital used interaction as the measurement index. The scale of the relational dimension of social capital used trust and commitment as the measurement index. The scale of the cognitive dimension of social capital used shared vision and shared language as the measurement index. A total of 25 measurement items were covered, such as "I communicate with group members positively in most cases but hardly communicate with other netizens holding different opinions," "I highly trust authority of information from group members," "I believe group members help and encourage mutually," "group members all hope to express one relatively uniform goal through online discussion," and "group members release information in the mutually understood form sometimes, such as connotation image and videos."

The scale of sense of virtual community mainly refers to the three dimensions of sense of community by Koh and Kim (2003) as well as the three dimensions of sense of virtual community of Han (2013). Certain adjustments and amendments were made according to actual situations in virtual communities. The scale covered nine measurement items, such as "I think I am a member of the group with significant existence," "I often post/reply messages in the group discussion," "I often plan to surf on the Internet but participate in group discussion and forget the time."

In the scale of network group behavior, the complexity of group behaviors determines its measurement complexity. No unified measurement has been developed yet. This study mainly refers to the measurement scale of network group behavior proposed by Zhao (2006), Yan (2013), and Zhang (2015). Three measurement items were designed to reflect the participation degree and participation level as well as continuous participation of members in network group behavior. Options were arranged in the ascending pattern. These three items have similar directions and scores with other items. For example, "For this even, my behavior online is?" "My online behaviors are to?" "In the future development of the event, I will focus on?"

The five-point Likert scale was used to measure all items in the questionnaire. After determining the initial questionnaire, pre-investigation and data analysis were carried out. Five measurement items with Corrected Item-Total Correlation (CITC) lower than 0.40 were deleted, which increased the validity of the remaining items. Then, a small expert interview of five relevant experts was organized and 10 designed measurement items were adjusted carefully to make the questionnaire

scientific and reasonable. Finally, the formal questionnaire consisting of 33 measurement items, including demographic statistical items, was determined.

Results

The reliability and validity of the proposed model were evaluated by SPSS20.0 and AMOS22.0. The structural model was tested.

Reliability and validity analysis of the questionnaire

The reliability of the investigation data was tested by the most common CITC and internal consistency coefficient (Cronbach's α value). During the evaluation of the confirmatory factor analysis (CFA), the SEM test must refer multiple fitting indexes. The considered indexes included absolute fitting index (x^2/dy x^2/df), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normative fitting index (NFI), incremental fit index (IFI), and mean square root of the approximation error (RMSEA). *Table 1* lists the validity and reliability of the questionnaire in this study. The results demonstrated that all the items of the three variables are higher than 0.3 which is the acceptable standards of CITC, and the Cronbach's α coefficient of scale is higher than 0.7, indicating the good reliability of the scale. From the fitting index of the model, x^2/dy of three variables was between 1 and 3. Values of GFI, AGFI, NFI, IFI, and CFI were higher than the ideal level of 0.9. RMSEA value was smaller than 0.08. That is, the results of confirmatory factor analysis (CFA) of all variable were in the acceptable range, indicating good structural validity.

Structural equation model test

In this study, theoretical models of "social capital-sense of virtual community," "social capital-network group behavior," and "sense of virtual community-network group behavior" were tested by AMOS22.0. *Table 2* shows the results. Clearly, that three absolute fitting indexes (x^2/dy) influencing the model were all smaller than 3. GFI, AGFI, NFI, IFI, and CFI were higher than the ideal level of 0.9, and RMSEA was smaller than 0.05. That is, the three relation models had a high degree of fitting. All three conditions for judging the mediation effect of sense of virtual community were verified.

Table 1. Reliability and Validity Analysis of the Questionnaire

Variable	Measure Dimensionality	CITC	Cronbach's α	x^2/dy	GFI	AGFI	NFI	IFI	CFI	RMSEA
Social capital	Structural dimension	≥.684	.926	2.543	0.903	0.938	0.915	0.926	0.933	0.047
	Relational dimension	≥.580		2.634	0.956	0.962	0.974	0.964	0.937	0.041
	Cognitive dimension	≥.491		2.549	0.937	0.974	0.962	0.945	0.904	0.048
Sense of virtual community	Membership	≥.586	0.921	2.784	0.926	0.938	0.965	0.944	0.964	0.033
	Influence	≥.711								
	Immersion	≥.694								
Network group behavior		≥.598	.728	2.643	0.947	0.952	0.985	0.944	0.931	0.042

Table 2. Fitting Indexes of the Model

Fitting model	x^2/dy	GFI	AGFI	NFI	IFI	CFI	RMSEA
Social capital-sense of virtual community	2.863	0.930	0.928	0.945	0.917	0.927	0.039
Social capital-network group behavior	2.364	0.924	0.947	0.931	0.954	0.948	0.049
Sense of virtual community-network group behavior	2.587	0.915	0.923	0.921	0.902	0.935	0.033

To determine whether the full and partial mediation models were true, their goodness of fit was compared to acquire the best matching model. *Table 3* shows the test results.

Table 3. Comparison of the Goodness of Fit of Three Mediation Models

Fitting model	x^2/dy	GFI	AGFI	NFI	IFI	CFI	RMSEA
Full mediation model	3.438	0.933	0.957	0.928	0.921	0.909	0.083
Partial mediation model	2.436	0.917	0.942	0.926	0.923	0.936	0.045
Modified partial mediation model	1.875	0.914	0.946	0.921	0.928	0.932	0.035

Results demonstrated that in the full mediation model, RMSEA = 0.083, which is higher than the upper limit of 0.08, indicating that the full mediation model between social capital and network group behavior has common goodness of fit. In the partial mediation model, RMSEA = 0.045 < 0.05, indicating a high goodness of fit of the model. That is, sense of virtual community mediates the influences of social capitals on network group behavior partially.

In testing the goodness of fit of the partial mediation model, the critical ratio (CR) values of the influencing coefficient of the cognitive dimension of social capital on the immersion were 0.549 and 1.731, smaller than the reference value of 1.96. The P values were 0.32 and 0.39. Such an influence fails to reach the acceptable goodness of fit of SEM. Therefore, the influence of cognitive dimension of social capital on the immersion was not tested. The modified model was gained by deleting the influencing path of cognitive dimension of social capital on the immersion, and the fitting analysis of this model was carried out. The results show that all the fitting indexes of the modified partial mediation model met the requirements (Table 4). Each path coefficient reached the significance level (P < 0.01). The goodness of fit of the modified model was better than those of full and partial mediation models. Statistical tests of the standard path coefficient of all relationships were significant in the modified partial mediation model (Figure 2.).

Table 4. Parameter Estimation of the Modified Partial Mediation Model

Action path	Standard load coefficient	S.E.	C.R.
Structural dimension of social capital-Membership Structural dimension of social capital-Influence Structural dimension of social capital-Immersion	0.79** 0.81*** 0.73**	0.133 0.169 0.124	4.469 5.619 5.523
Relational dimension of social capital-Membership Relational dimension of social capital-Influence Relational dimension of social capital-Immersion	0.88*** 0.77*** 0.83**	0.225 0.218 0.545	6.011 4.957 7.144
Cognitive dimension of social capital-Membership Cognitive dimension of social capital-Influence	0.75** 0.68**	0.339 0.179	5.431 6.938
Membership-Network group behavior Influence-Network group behavior Immersion-Network group behavior	0.68*** 0.59** 0.62***	0.263 0.278 0.125	5.194 4.637 5.981
Structural dimension of social capital-Network group behavior Relational dimension of social capital-Network group behavior Cognitive dimension of social capital-Network group behavior	0.72** 0.79*** 0.65**	0.321 0.124 0.321	4.642 6.338 6.063

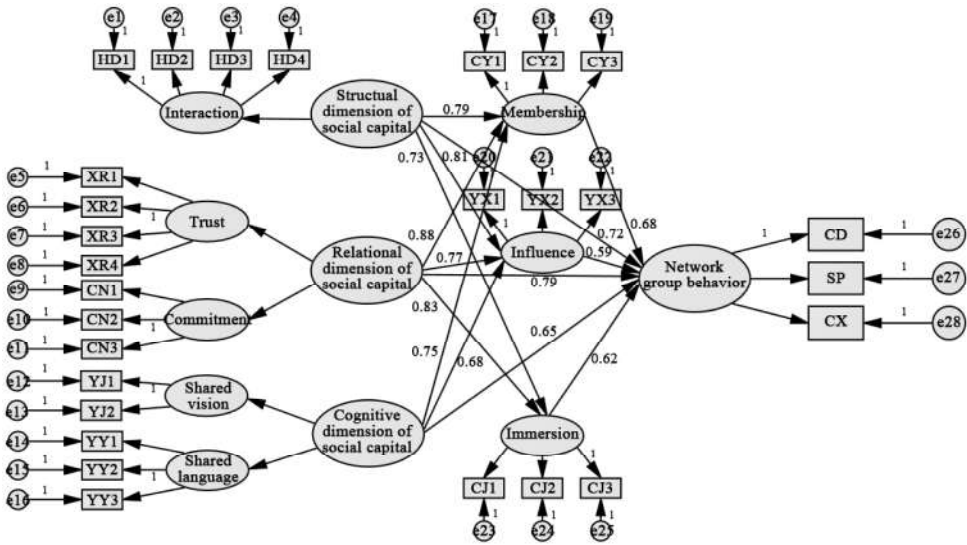*Notes: ** and *** are P < 0.01 and P < 0.005.*

Figure 2. Modified Partial Mediation Model

Discussion

Based on the above analysis, all research hypotheses have been verified by empirical studies except Hypothesis 5d. In this study, social capital is used as an independent variable, network group behavior as a dependent variable, and sense of virtual community as an intermediate variable. The psychological perception model of social capital influencing network group behavior is established. From the perspective of virtual community management, specific interventions to enhance the internal management of virtual communities in order to encourage positive group behaviors are proposed.

First, social capital can encourage members to participate in network group behavior. From the parameter estimation based on the revised model of partial mediation, the CR of three-dimensional social capital is higher than 1.96, and P value is significant at the 0.01 level. That is, social capital can encourage members to participate in network group behavior. This study verifies the opinions of Nahapiet and Ghoshal (1998), Wasko and Faraj (2005). Based on the standardized path coefficient between social capital and network group behavior, three dimensions of social capital facilitate network group behavior differently. The relational dimension of social capital influences network group behavior mostly, that is, if network group members have great trust in and commitment to other members,

then such members are willing to participate in network group behavior. Influences of the structural dimension of social capital on network group behavior are higher than those of cognitive-dimensional social capital.

Therefore, trust is one of the most important factors in enhancing internal management of virtual communities and encouraging positive network group behaviors. Virtual community managers shall pay special attentions to cultivate the sense of trust among group members. First, the speech and information in the virtual community should be strictly managed, and those such as conspiratorial speech, inciting speech, fraudulent speech, obscene speech, and defamatory speech should be deleted in time to enhance the cognitive trust among members. Second, the sharing culture should be established in virtual communities. A group atmosphere that is full of sharing is the premise of trust. Developing such trust is important to the acquisition of social capital resources from virtual communities. Third, the communication mechanism should be established. This study discovers that shared language plays an important role in the acquisition of social capital; meanwhile, shared language and trust are highly correlated. Thus, the use of shared language among different members can increase mutual trust.

Interaction is another important factor that influences network group behavior. Virtual community managers should pay attention to enhance interaction and communication among virtual community members. Specifically, (1) managers should create diversified platforms for interactive communication, and encourage users to participate in interactions and discussions by regular activities, thus enhancing the closeness of relationship. (2) They should pay attention to users with high relationship strength. Active users with high relationship strength can be recognized through the number of followers, posts, replies, and reposts in a certain period. Moreover, it should adopt effective incentives (e.g., virtual money, virtual medals, and star users) to encourage users to develop creativity, and to participate in network group behavior positively.

Second, Social capital encourages members to participate in group behaviors through the mediation of sense of virtual community. That is, social capital indirectly stimulates members' participation in network group behavior by influencing their sense of virtual community, and sense of virtual community can mediate the relationship between social capital and network group behavior differently. In this study, the goodness of fit of the full and part mediation models is compared. The final optimal matching model is the modified partial mediation model. On the basis of relevant scholars' research, this study expands the research of relationship between social capital and network group behavior.

Sense of virtual community mediates the relationship between social capital and network group behavior differently. Virtual community managers should pay attention to the cultivating of membership and immersion. First, a definite group goal should be established, which is conducive to develop membership continuously. As a result, relationship and trust can be maintained, and group members will get

used to participating in group behaviors. Second, online and offline interactions should be organized to make network group behavior transiting to actual group behavior. The sense of identification and belonging of members to the community can be enhanced from the "virtual" and "reality" aspect, and this establishes the emotional dependence of group members. Third, diversified community modules or product functions should be developed. New members are attracted, and the online activity time of old members is prolonged by continuous development of new products and applications. Diversified products and applications for social contact can deepen the immersion of members.

Third, Hypothesis 5d, which has not been proven, reflects that the high cognitive dimension of social capital may not bring high immersion in some cases. The group interview reveals that although some group members have similar goals with other members, they may not be addicted to network group discussion. At the occurrence of other hot events, these group members can easily change opinions and can be easily involved in other network group behaviors. It can be seen that even if some group members share the same vision, they may not form the sense of immersion, which may be due to high fluidity of members and cost-free information acquisition.

Conclusion

This study investigates members' participation in network group behavior thoroughly from the perspective of social capital. A research path of "social capital-sense of virtual community-network group behavior" is constructed. An empirical test based on the use of SPSS and SEM is carried out. The influencing factors and action mechanisms of network group behavior are interpreted. Major conclusions can be drawn through theoretical and empirical studies. (1) This study investigates members' participation in network group behavior from the perspective of social capital. The relationship between social capital and network group behavior can be disclosed by the partial mediating effect of sense of virtual community. (2) Different dimensions of social capital have direct impacts on network group behavior, but the impact degree varies. The relational dimension of social capital has the most prominent positive impacts on network group behavior. The positive impacts of the structural dimension of social capital on network group behavior are stronger than those of the cognitive dimension of social capital. (3) Different dimensions of social capital have positive indirect impacts on network group behavior by the sense of virtual community. (4) The theoretical analysis framework of "social capital-sense of virtual community-network group behavior" prompts that virtual community managers should cultivate social capital and sense of virtual community, aiming to encourage members participating in network group behavior positively.

The research conclusions have theoretical and practical significance for virtual community managers developing social capital, create sense of virtual community, and thereby encourage positive network group behaviors. However, this study has certain limitations. The research topic has been simplified appropriately to adapt to the virtual community scenario. In the measurement of network group behavior, the method of inquiry is used to obtain the attitude of members to group behavior, which is objectively representative, but it is still inadequate. In subsequent studies, causes of network group behavior, dimensions of social capital, as well as the measurement indexes of network group behavior should be discussed systematically.

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References

Blanchard, A.L., & Markus, M.L. (2004). The experienced sense of a virtual community: characteristics and processes. *Database for Advances in Information Systems*, *35*(1), 65-79.

Cao, Y., & Xiang, Y. (2014). Study on the relationship among knowledge governance，knowledge sharing and employee innovation based on the mediating of social capital and the moderating of absorptive capacity in enterprises. *Studies in Science of Science, 32*(1), 35-42.

Cao, Z.L. (2015). Empirical study on affection for lock-in effect by perceived value. *Journal of Modern Intelligence, 35*(8), 35-38.

Chang, Y.P., & Zhu, D.H. (2012). The role of perceived social capital and flow experience in building users' continuance intention to social networking sites in china. *Computers in Human Behavior,* (28), 995-1001.

Chen, H., Xue, T., & Yue, G.A. (2012) . Instrumentality, social identity, and group-based anger: overview of collective action research. *Advances in Psychological Science, 20*(1), 15-22.

Chen, M.H., & Qi, X.J. (2014). Research on knowledge share in academic virtual community in the perspective of social capital. *Information Studies: Theory & Application, 37*(9), 101-105.

Chiu, C., Hsu, M., & Wang, E.T. (2006). Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories. *Decision Support Systems, 42*(5), 1872-1888.

Chowdhury, S. (2005). The role of affect and cognition based trust in complex knowledge sharing. *Journal of Managerial Issues, 17*(3), 310-326.

Deng, Y. (2013). *An empirical study on subsequent use and continued use of members in online communities.* Unpublished doctorial dissertation, Huazhong University of Science and Technology, Wuhan.

Du, J.F., & Wei, J. (2010). Political sociology of network cluster: essence, type and utility. *Journal of Southeast University (Philosophy and Social Sciences), 12*(1), 43-50.

Ellison, N.B., Vitak, J., Gray, R., & Lampe, C. (2014). Cultivating social resources on social network sites: facebook relationship maintenance behaviors and their role in social capital processes. *Journal of Computer Mediated Communication, 19*(4), 855-870.

Ellonen, H.K., Kosonen, M., & Henttonen, K. (2007). The development of a sense of virtual community. *International Journal of Web Based Communities, 3*(1), 114-130.

Fang, Y.L., & Derrick, N. (2008). Understanding sustained participation in open source software projects. *Journal of Management Information Systems, 25*(4), 9-50.

Flynn, F.J. (2005). Identity orientations and forms of social exchange in organizations. *Academy of Management Review, 30*(4), 737-750.

Gao, L.L., & Bai, X.S. (2014). An empirical study on continuance intention of mobile social networking services. *Asia Pacific Journal of Marketing and Logistics, 26*(2), 168-189.

Ge, H.N., Zhou, Z.K., Niu, G.F., & Chen, W. (2016). Can social network sites use bring social capital to users?. *Advances In Psychological Science, 24*(3), 454-463.

Guinea, A.O., & Markus, M.L. (2009). Why break the habit of a lifetime? Rethinking the roles of intention, habit, and emotion in continuing information technology use. *MIS Quarterly, 33*(3), 433-444.

Guo, L., Zhang, Y., Zhou, D.M., & Lu, R.Y. (2014). Community interaction in virtual community: research review. *Technological Economy,* (12), 30-38.

Han, Y.J. (2013). Research on effects of sense of virtual community on innovative behaviors of users: a case study based on virtual game community. Unpublished doctorial dissertation, Zhejiang University, Hangzhou.

Hatris, L.C., & Goode, M.M.H. (2004). The four levels of loyalty and the pivotal role of trust: a study of online eservice dynamics. *Journal of Retailing, 80*(9), 139-158.

Hogg, M.A., & Hardie, E.A. (2006). Prototypicality, conformity and depersonalized attraction: a self-categorization analysis of group cohesiveness. *British Journal of Social Psychology, 31*(1), 41-56.

Hsu, C.L., & Lu, H.P. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. *Information & Management, 41*(7), 853-868.

Koh, J., & Kim, Y.G. (2003). Sense of virtual community: a conceptual framework and empirical validation. *International Journal of Electronic Commerce, 8*(2), 75-93.

Luo, J.D., & Fang, Z.P. (2014). Measurement of community social capitals –one measurement method involving social network view. *Jiangsu Social Sciences,* (1), 114-124.

Luo, J.D., Zhen, M.Y., & Xie, Z.Q. (2007). The effect of social capital on individual sharing of knowledge in communities of practice. *Jiangsu Social Sciences,* (3), 131-141.

Mackie, D.M., Devos, T., & Smith, E.R. (2000). Intergroup emotions: explaining offensive action tendencies in an intergroup context. *Journal of Personality & Social Psychology, 79*(4), 602-16.

Mcfadyen, M.A., & Cannella, A. (2004). Social capital and knowledge creation: diminishing returns of the number and strength of exchange. *Academy of Management Journal, 47*(5), 735-746.

Mcmillan, D.W., & Chavis, D.M. (1986). Sense of community: a definition and theory. *Journal of Community Psychology, 14*(2), 6-23.

Merlo, O., Bell, S.J., Mengüç, B., & Whitwell, G.J. (2006). Social capital, customer service orientation and creativity in retail stores. *Journal of Business Research, 59*(12), 1214-1221.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review, 23*(9), 242-266.

Ning, L.J., & Zhang, Y.H. (2014). Empirical study on influences of sense of virtual community on user' loyalty. *Technology Economics, 33*(11), 7-15.

Ridings, C., Gefen, D., & Andarinze, B. (2002). Some antecedents and effects of trust in virtual communities. *Journal of Strategic Information Systems, 11*(3), 271-295.

Rogers, E.M., & Kincaid, D.L. (1981). *Communication networks: toward a new paradigm for research*. New York: The Free Press.

Shi, W.P. (2016). *Research on the behavior guide of irrational cluster for WeChat user in emergencies*. Unpublished doctorial dissertation, Shanxi University of Finance and Economics, Taiyuan.

Sun, L.X. (2012). Interpersonal citizenship behavior model construction based on social capital view. *China Management Magazine(Academic Edition),* (10), 3-9.

Tonteri, L., Kosonen, M., Ellonen, H.K., & Tarkiainen, A. (2011). Antecedents of an experienced sense of virtual community. *Computers in Human Behavior, 27*(6), 2215-2223.

Tsai, Y.H., Joe, S.W., Lin, C.P., Wang, R.T., & Chang, Y.H. (2012). Modeling the relationship between it mediated social capital and social support: key mediating mechanisms of sense of group. *Technological Forecasting & Social Change, 79*(9), 1592-1604.

Valck, K., Van, B., G.H., & Wierenga, B. (2009). Virtual communities: a marketing Perspective. *Decision Support Systems, 47*(3), 185-203.

Van, Z.M., Postmes, T., & Spears, R. (2012). On conviction's collective consequences: integrating moral conviction with the social identity model of collective action. *British Journal of Social Psychology, 67*(5), 52-71.

Van, Z.M., Spears, R., Fischer, A.H., & Leach, C.W. (2004). Explaining collective action tendencies through group-based anger and group efficacy. *Journal of Personality and Social Psychology, 87*(10), 649-664.

Wang, X.D., Wu, L., & Wang, D. (2016). Research on motivation model of virtual community forming. *Information Science,* (3), 117-121.

Wasko, M., & Faraj, S. (2000). It is what one does: why people participate and help others in electronic communities of practice. *The Journal of Strategic Information Systems, 9*(2), 155-173.

Wasko, M., & Faraj, S. (2005). Why should i share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly, 29*(1), 35-57.

Wu, M.L. (2013). *Structural equation model: Amos practice progress*. Chongqing: Chongqing University Press.

Xu, G., Zhang, X., Li, Z.G., & Tian, Y.Z. (2016). A study on social capital and organizational citizenship behavior research: the impact of virtual community sense and community participation. *Management Review, 28*(7), 213-225.

Yan, H.N. (2013). *Research of behavior differences among cyberspace groups in public crisis*. Unpublished doctorial dissertation, University of Electronic Science and Technology of China, Chengdu.

Zhang, Y.H. (2015). *An empirical study: effects of the sense of virtual community on the users' loyalty based on social capital theory*. Unpublished doctorial dissertation, Beijing University of Posts and Telecommunications, Beijing.

Zhao, D.L., Sun, D.Y., & Zhang, T.S. (2016). Research on influences of social capitals on knowledge sharing intention of users in the circle of friends on WeChat. *Information Studies: Theory & Application, 39*(3), 102-107.

Zhao, L., Lu, Y.B., & Deng, C.H. (2009). A study on sense of virtual community based on social capital theory. *Chinese Journal of Management, 6*(9), 1169-1175.

Zhao, M.L. (2006). *Research on participation motivation of non-transaction virtual community members*. Unpublished doctorial dissertation, Zhejiang University, Hangzhou.

Zhao, Y.D., & Luo, J.D. (2005). How to measure the social capital: one empirical research review. *Social Sciences Abroad,* (2), 18-24.

Zhen, T. (2013). *Network collective behavior and government regulation*. Unpublished doctorial dissertation, Jilin University, Changchun.

Zhou, T., & Lu, Y.B. (2008). Explaining mobile community user participation based on social capital theory. *Journal of Management Science, 21*(3), 43-50.

Zhuang, Y.M. (2015). Review and expansion of the organizational social capital from multilevel perspective. *Science Research Management, 36*(1), 97-103.