User perceptions of e-quality of and affinity with virtual communities:

The effect of individual differences

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ABSTRACT

Following the information systems (IS) success model, this study explores the effect of individual differences on users' perceptions of virtual communities in terms of e-quality (namely, information quality, system quality and service quality) of and affinity with virtual communities given individual differences are crucial in determining how individuals think and respond to the environment. This study examines the effect of individual differences on virtual community success dimensions from both physical and psychological perspectives, which we think presents a new view for virtual community research and practice alike. Data collected from users of virtual communities were used for data analysis. First, the cluster analysis was applied and five personality trait clusters were identified in terms of extraversion, agreeableness, openness to new experience, conscientiousness and neuroticism. Then, the independent sample t test and one-way analysis of variance (ANOVA) were employed. The effect of individual differences in terms of gender, age, position, experience with virtual communities as well as the five personality trait clusters on users' perceptions of e-quality of and affinity with virtual communities was explored and discussed.

Keywords:

Information quality, System quality, Service quality, Affinity, Individual differences, Virtual communities

1. Introduction

Virtual communities are described as "online social networks in which people with common interests, goals, or practices interact to share information and knowledge, and engage in social interactions" (Chiu, Hsu, & Wang, 2006, p. 1873). A virtual community is a virtual space which provides a platform for people with common interests to interact and communicate with each other to generate and exchange specific information. It enables users to perform common functions, learn from each other, share knowledge, and contribute to the community (Governatori & Iannel, 2011). Consequently, virtual communities not only bring users together to meet some of their social needs, but also aggregate information and resources (Rothaermel & Sugiyama, 2001), thus

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becoming an integrated part of the information seeking landscape (Ostrander, 2008). Individuals can come to virtual communities to find relevant information they are interested in whether they have explicit queries or not, because virtual communities are likely to be congenial information environments (Burnett, 2000). In this study, we focus on the context of China, where there are many popular virtual communities such as Baidu Know, Baidu Document, ScienceNet Blog, Chinese Wikipedia and Sina Microblog, each of which attracts millions of users. Given the phenomenal growth, virtual communities are facing increasing competition to attract and retain online members. That is to say, the success of virtual communities can be achieved only when there are a significant number of users who are willing to stay and exchange information with others (Cheung & Lee, 2009).

The information systems (IS) success model has been widely used to assess the success of information systems, virtual communities being no exception (e.g., Lin & Lee, 2006; Lin, 2008; Rodgers, Negash, & Suk, 2005; Yang, 2007). The IS success model was proposed in 1992 and updated in 2003 by DeLone and McLean (1992, 2003). According to the updated IS success model (DeLone & McLean, 2003), IS success dimensions concern system quality (technical success), information quality (semantic success), service quality, as well as intention to use/use, user satisfaction and net benefits (effectiveness success). In the present study, we use the term e-quality to refer to information quality, system quality and service quality of virtual communities. Affinity with virtual communities is defined as the degree of importance that users place on virtual communities (Perse, 1986; Mafé & Blas, 2006) and the degree to which users feel bonded to them (Li, 2011). We suggest affinity with virtual communities can be used to measure one important aspect of effectiveness success of virtual communities. Previous studies have paid a great deal of attention to the relationship among IS success dimensions (e.g., Lin & Lee, 2006; Lin, 2008; Li, 2011; Barnes & Pressey, 2011). However, to the best of our knowledge, the effect of users' individual differences especially the personality traits on their perceptions of virtual communities in terms of e-quality and affinity has been largely overlooked in the literature.

Individual differences affect the way people think and react to the environment (Lu & Lee, 2010). In this study, individual differences include physical and psychological differences. Specifically, physical differences refer to gender, age, position and experience with virtual communities. Psychological differences refer to individuals' personality traits which consist of extraversion, agreeableness, openness to new experience, conscientiousness and neuroticism (Zhou & Lu, 2011). Although users' personality traits may be crucial factors leading them to engage in virtual communities (Correa, Hinsley, & de Zúñiga, 2010), previous research examined the distinct dimension of personality traits independently. For example, users with a high level of openness to new experience tend to use virtual communities more heavily (Ross et al., 2009). Extravert users are more likely to use Facebook (Jenkins-Guarnieri, Wright, & Hudiburgh, 2012). Özgüven and Mucan (2013) investigated the relationship between social media use and users' personality factors. Correa et al. (2010) used a national sample of US adults to investigate the relationship between three dimensions of the Big-Five model (extraversion, emotional stability and openness to experience) and social media use. Given individual's personality is formed by a unique combination of different levels of each of the five trait dimensions (Heinström, 2005), this study employs cluster analysis to identify the personality trait clusters in terms of extraversion, agreeableness, openness to new experience, conscientiousness and neuroticism. Furthermore, this study uses the identified personality trait clusters as the grouping criterion to explore the effect of

psychological differences on users' perceptions of e-quality of and affinity with virtual communities. The research questions of this study are: Do physical differences in terms of gender, age, position and experience with virtual communities have effects on users' perceptions of e-quality of and affinity with virtual communities? Do psychological differences in terms of personality trait clusters have effects on users' perceptions of e-quality of and affinity with virtual communities? This study explores the effect of both physical differences and psychological differences on virtual community success dimensions, which we think provides a new view for virtual community research and practice alike.

Following this introduction, we review the research background, paying attention to virtual communities and e-quality, user affinity with virtual communities, and personality traits. Then, we describe the research methodology and data collection. Finally, the results of the research and the discussion and implications are presented.

2. Research background

2.1. Virtual communities and e-quality

Formed on the Internet, virtual communities are computer-mediated spaces where there is an integration of content and communication with an emphasis on user generated content (Lee, Vogel, & Limayem, 2003), expected to serve users' needs for communication, information and entertainment (Lin, 2006). There are various types of virtual communities on the Web, such as learning communities, health communities, communities supporting political activities and so on (Zorn, 2004). Characterized by anonymity and voluntary (Lin, 2008), virtual communities can lower the participation barrier and support the creation and maintenance of weak ties among strangers (Ellison, Steinfield, & Lampe, 2007). Users can gain knowledge of their interested area and develop relationship with others having similar interests (Gupta & Kim, 2004). Burnett (2000) suggested that virtual communities function for their users not only as social settings, but also as information neighborhoods within which they can engage in ongoing information sharing activities. Moreover, virtual communities serve as a valuable channel for purposeful everyday life information seeking (Sin & Kim, 2013). Users can screen and judge the characteristics of these information sources based on the profile information and other characteristics of virtual communities (Obal, Burtch, & Kunz, 2012).

Quality reflects "a degree of excellence" (Babalhavaeji, Isfandyari-Moghaddam, Aqili, & Shakooii, 2010, p. 594). The updated IS success model formed the important starting point to assess the quality of IS artifacts (Cody-Allen & Kishore, 2006), covering three important quality dimensions, namely, system quality measuring technical success, information quality measuring semantic success, and service quality (DeLone & McLean, 2003). Service quality was derived from product quality and customer satisfaction literatures (DeLone & McLean, 2003; Lin, 2007). In the IS success model, DeLone and McLean didn't mention what kind of success service quality can measure and we suggest service quality can potentially measure application success of IS. Following Delone and McLean (1992, 2003), e-quality in this study refers to information quality, system quality and service quality. Specifically, information quality is defined as "the quality of outputs the information system produces which can be in the form of reports or online screens" (Gorla, Somers, & Wong, 2010, p. 213), associated with completeness, accuracy and currency (Zhou, 2011). System quality is defined as "the quality of the information system processing itself,

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which includes software and data components, and it is a measure of the extent to which the system is technically sound" (Gorla et al., 2010, p. 212), associated with reliability, effective navigation, and clear layout (Zhou, 2011). Service quality is defined as "the level of service delivered by IS service providers to users in terms of reliability, responsiveness, assurance, and empathy" (Gorla et al., 2010, p. 208), concerning dependability, promptness, personalization and professionalization (Zhou, 2012).

Researchers have paid a great deal of attention to e-quality issues in recent years due to the importance of virtual communities in people's everyday lives. Cho and Lee (2008) indicated that information seeking in an online environment would be rationally driven by the search for quality information. Pearson, Tadisina and Grifin (2012) examined the role of e-service quality and information quality in creating perceived value and web site loyalty. Lin (2008) examined the impact of system characteristics on the success in virtual communities and found information quality and system quality could affect members' satisfaction with virtual communities. Lin and Lee (2006) stated that quality-perception dimensions were the key antecedents of the effectiveness of online communities. Lu and Lee (2010) explored blog quality, the need of cognition and social influence as the antecedents of blog stickiness, and the results suggest that males consider system quality to be a significant factor in deciding whether to revisit whereas females only focus on content quality. Lim and Kwon (2010) examined gender differences in information behavior concerning Wikipedia and found that male students reported having more positive experiences with the information quality of Wikipedia than their female counterparts. Lim (2009) found that students have positive past experiences with Wikipedia; however, their perceptions of its information quality are not correspondingly high. Jin et al. (2009) revealed that individuals would continue to use the information in a computer-supported social network when they perceived the usefulness of information in the network which was determined by information quality.

2.2. User affinity with virtual communities

The uses and gratifications theory attempts to explain what social and psychological needs motivate individuals to select particular media channels and content choices (Rubin & Perse, 1987). The theory points out that affinity which was described as the extent to which an individual perceives the importance of a medium in his/her life (Rubin, 1981; Perse, 1986), has been utilized to assess general attitudes of individuals towards a medium and/or its content (Rubin & Perse, 1988; Ferguson & Perse, 2000).

Affinity has been used in prior studies to represent individual's characteristic (e.g., Mafé, Blas, & Tavera-Mesías, 2010; Barnes & Pressey, 2011), to act as a driver of one specific intention or behavior (e.g., Rubin, 1981; Li, 2011; Bigné, Ruiz, & Sanz, 2007; Stern, Royne, Stafford, & Bienstock, 2008) or as the attitudinal outcome (e.g., Papacharissi & Rubin, 2000). Nevertheless, as far as we know, research into different users' perceptions of affinity with virtual communities from demographic and psychological perspectives has been largely overlooked. Following general affinity with media (Rubin, 1981; Kinnally, Lacayo, McClung, & Sapolsky, 2008) and affinity with technology (Stern et al., 2008), in this study, we examine user affinity with virtual communities which is defined as the degree of importance that users place on virtual communities (Perse, 1986; Mafé & Blas, 2006) and the degree to which users feel bonded to them (Li, 2011). According to the updated IS success model (DeLone & McLean, 2003), we suggest affinity with virtual communities which reflects the attitude towards the impact of virtual communities

developed from past experience with them (Rubin, Perse, & Powell, 1985), can usefully measure one important aspect of effectiveness success of virtual communities. In Li's (2011) study, community affinity reflects the closeness of one' connection to and relationship with the virtual community and it could lead to more frequent use of the information available in the community. If users feel virtual communities are important and inseparable, they tend to be more willing to incorporate them into their everyday lives.

2.3. Personality traits

Personality is defined as a "pattern of characteristic thoughts, feelings, and behaviors that distinguishes one person from another" (Phares, 1991, p. 4), reflecting a critical psychological mechanism that guides an individual's behavior (Kwon & Song, 2011). In this study, we employ the Big Five model of personality traits, which is by far the most commonly used model for measuring personality. This model indicates that the majority of individual differences in personality can be classified into five broad domains (Gosling, Rentfrow, & Swann, 2003), namely, extraversion, agreeableness, openness to new experience, conscientiousness and neuroticism. Different personality traits of individuals determine their online behaviors (McCrae & Costa, 1987).

Specifically, extraversion refers to the extent to which an individual is outgoing and talkative and extroversive users are associated with behaviors such as being sociable, gregarious, assertive and active (McCrae & Costa, 1985; Peeters, Rutte, van Tuijl, & Reymen, 2006). Agreeableness refers to the extent to which an individual is cooperative and friendly. People scoring high on agreeableness display behaviors such as being courteous, flexible, trusting, good-natured, forgiving, softhearted and tolerant (McCrae & Costa, 1985; Peeters et al., 2006; Barrick, Mount, & Gupta, 2003). Openness to new experience describes the extent to which an individual is imaginative and curious. Highly open people can be described as being cultured, original, broad-minded, intelligent and artistically sensitive (McCrae & Costa, 1985; Peeters et al., 2006). Conscientiousness reflects the extent to which an individual is self-disciplined and organized, dependable, concerned with details, planful, hardworking, achievement oriented and persevering (McCrae & Costa, 1985; Peeters et al., 2006; Gosling et al., 2003). People scoring high on conscientiousness usually tend to set a limited number of substantive goals, behave dutifully and morally and display goal-motivated behaviors (McCrae & Costa, 1985; Peeters et al., 2006; Hough et al., 1990). Those scoring low on conscientiousness tend to be more careless and are prone to changing their positions (Zhou & Lu, 2011). Neuroticism refers to the extent to which an individual is in a state of emotional instability, heightened pessimism, and low self-esteem (Lin, Chiu, & Hsieh, 2001; Walczuch & Lundgren, 2004), associated with behaviors such as being anxious, depressed, angry, embarrassed, emotional, worried and insecure (McCrae & Costa, 1985; Peeters et al., 2006). Those scoring high on neuroticism are typically troubled by potential loss and risks, and they are not likely to open themselves to new experiences (Zhou & Lu, 2011).

The Big Five inventory has been in common use in various settings, including virtual communities (Amichai-Hamburger & Vinitzky, 2010) and individuals' information behaviors (Heinström, 2003, 2006b; Kwon & Song, 2011). Jadin, Gnambs and Batinic (2013) investigated the effects of personality traits on knowledge sharing in a virtual open content community. Users with a high level of openness to new experiences also tend to use virtual communities more heavily (Ross et al., 2009). Jenkins-Guarnieri et al. (2012) indicated that extraversion was

positively related to Facebook use. Sin and Kim (2013) analyzed international students' everyday life information needs, their usage of SNS for seeking information, and the relationships among demographics, personality traits, SNS usage, and perceived usefulness of the acquired everyday life information. Özgüven and Mucan (2013) investigated the relationship between virtual communities and users' personality factors and found conscientiousness and openness to experience are significant predictors of the usage of virtual communities. Heinström's (2003) research reported that information behavior could be connected to all the five dimensions of personality traits. Heinström (2005) explored information behavior from a psychological perspective by relating information seeking to personality traits and study approach, identifying three unique information seeking patterns in terms of different combinations of personality traits. In another separate study, Heinström (2006a) investigated the relationship between information seeking patterns and personality traits and found that precise searching that focused specifically on high-quality information seemed typical for conscientious students with a deep strategic study approach.

3. Method and Data Collection

3.1. Measures development

All items of the survey instrument were adapted from prior studies in terms of the context of virtual communities to preserve the content validity (Straub, Boudreau, & Gefen, 2004). Specifically, the items measuring information quality of virtual communities and system quality of virtual communities were adapted from Zhou (2011) and Wixom and Todd (2005). The items measuring service quality of virtual communities were adapted from Zhou (2011, 2012). For the construct affinity with virtual communities, the measurement items were adapted from Aldás-Manzano, Ruiz-Mafé and Sanz-Blas (2009). The items measuring the five personality traits were adapted from Gosling et al. (2003) and Zhou and Lu (2011). After the instrument was developed, a pilot survey was conducted among 20 graduate students. Based on their feedback and comments, we adjusted wordings in some items to improve the understandability. The finial instrument can be found in the Appendix. All the constructs in the research have multiple items, each of which was measured with a seven-point Likert scale ranging from 1(strongly disagree) to 7(strongly agree).

3.2. Data collection

The large scale survey data collection lasted for five weeks through an online survey website. In order to ensure that all the participants had a consistent concept, the description of virtual communities was given at the beginning of the questionnaire, namely, virtual communities refer to online social networks in which information and knowledge can be shared among people who have common goals, interests, or practice. Meanwhile, some popular Chinese virtual communities such as Baidu Know, Baidu Document, Chinese Wikipedia, ScienceNet Blog and Sina Microblog were listed as examples in the questionnaire. Although each virtual community has different features, especially in terms of interface design, the basic premise of virtual communities is that they function for their members not only as social settings but also as "information neighborhoods" (Burnett, 2000). Given that all virtual communities share the same basic premise, it is reasonable to treat virtual communities as a whole and explore user perceptions of e-quality of

and affinity with them.

According to China Internet Network Information Center (CNNIC), there are 591 million Internet users in China by the end of June, 2013. The penetration of the Internet has reached a higher level for the people whose education background is high school, undergraduate or above, and the majority of Internet users are users of virtual communities such as blog, microblog and social networks (CNNIC, 2013). This study targeted users of virtual communities who study or work in ten Chinese universities. Drawing on the column of personal profiles on the website of these ten Chinese universities, we randomly selected potential participants and recorded their e-mail and instant messaging addresses. Moreover, we contacted these ten universities by alumni, asking for their help to collect the e-mail and instant messaging address lists of potential participants. For all the email and instant messaging addresses available, we deleted the duplicate addresses after careful checking. Then, we published the questionnaire online, inviting the potential participants to visit our online questionnaire through e-mail or instant messaging where the purpose of our study was explained and their participation was solicited and appreciated. Data collection was undertaken on a voluntary basis without any extra rewards and the response rate was approximately 60%. Consequently, data collected from 357 users of virtual communities were used for data analysis after the invalid responses were deleted. The criteria for the deletion are: the responses in which 4's was chosen for every item on a single questionnaire were deleted; based on the amount of time by each respondent recorded by the online survey website, the responses finished within 150 seconds were deleted. Table 1 documents the profile information of these 357 respondents.

Insert Table 1 about here

4. Data Analysis and Results

4.1. Measurement model validation

We first assessed measurement validation through content validity, convergent validity and discriminant validity (Straub et al., 2004) before data analysis. With respect to content validity, since all the constructs and items in this study were based on the existent literature, we thus believe these constructs and items each have clear and correct meaning.

Table 2 lists the values of AVE (Average Variance Extracted), CR (Composite Reliability) and Cronbach's Alpha. Reliability and convergent validity were assessed with AVE, CR and Cronbach's Alpha, and can be established with a score greater than 0.5, 0.7 and 0.7 respectively (Straub et al., 2004). Form Table 2, all values of CR, Cronbach's Alpha and AVE exceed the recommended cut-off values, suggesting higher reliability and convergent validity of all the constructs.

Insert Table 2 about here

Discriminant validity can be assessed by comparing correlations between constructs and the square roots of AVE of each construct (Fornell & Larcker, 1981). The results in Table 3 suggest that the square root of AVE of each construct is obvious larger than its correlations with other

constructs, which demonstrates sufficient discriminant validity of measurement model in this study.

Insert Table 3 about here

As suggested by Gefen, Straub and Boudreau (2000), we examined the item loadings and cross loadings to further assess the convergent validity and discriminant validity of our measurement instrument. All item loadings listed in Table 4 are above 0.7, well exceeding the threshold value of 0.5 (Hair, Black, Babin, Anderson, & Tatham, 2006; Tabachnick & Fidell, 2007), which further confirms the adequate convergent validity. Moreover, the loadings of each item are much higher on their assigned constructs than on others, further demonstrating discriminant validity.

Insert Table 4 about here

4.2. Research hypotheses

This study aims to explore the exact nature of users' perceptions of virtual communities in terms of e-quality of and affinity with virtual communities, focusing on 4 aspects (constructs), viz.: information quality of virtual communities (IQVC), system quality of virtual communities (SYSQVC), service quality of virtual communities (SERQVC), and affinity with virtual communities (AFFVC). In order to explore the influence of users' demographic characteristics on their perceptions of e-quality and affinity, the following null hypotheses are proposed:

H1. There is no significant difference between male and female users in terms of their perceptions of e-quality and affinity.

H2. There is no significant difference among various age groups of users in terms of their perceptions of e-quality and affinity.

H3. There is no significant difference among users with different positions in terms of their perceptions of e-quality and affinity.

H4. There is no significant difference among users with different years of experience with virtual communities in terms of their perceptions of e-quality and affinity.

In order to explore the influence of users' personality traits on their perceptions of e-quality and affinity, a cluster analysis was applied using SPSS. Given the exploratory nature of the current research, we followed a two-stage procedure as suggested by Ketchen and Shook (1996). In the first stage, a hierarchical cluster analysis was conducted in which Ward's minimum variance method was utilized for cluster formation and Euclidean distances were used as the similarity measure. The selection of the number of clusters is an essential but potentially thorny issue in cluster analysis (Sun, 2012). Following Sun (2012), the amalgamation coefficients were consulted to determine the number of clusters, which suggests a 5-cluster solution. In the second stage, a K-means cluster analysis was conducted. As suggested by the hierarchical cluster analysis in the first stage, a K value of 5 was thus specified when conducting the K-means cluster analysis. Consequently, the 357 samples were divided into five clusters. The one-way ANOVA analysis indicated that significant differences exist among the five clusters in terms of all the five

dimensions of personality traits (see Table 5). As listed in Table 5, multiple comparisons further show how the five clusters differ on specific personality traits.

Insert Table 5 about here

Table 6 presents the five clusters' patterns of personality traits and each cluster was given a term based on the characteristics conveyed by the corresponding parameter values listed in Table 5. We used the term non-intensive personality traits to represent Cluster 1, which is characterized by the low level of all the five personality traits. We used the term conscientiousness-neuroticism personality traits to represent Cluster 2, which is characterized by a combination of high levels of conscientiousness and neuroticism, moderate levels of agreeableness and extraversion and a low level of open to new experience. We used the term in-between personality traits to represent Cluster 3, which is characterized by the higher level of all the five personality traits than that of Cluster 1 and the lower level of those personality traits than that of Cluster 4. We used the term intensive personality traits to represent Cluster 4, which is characterized by the high level of all the five dimensions of personality traits. Many cases fell into Cluster 4 (124/357). We used the term agreeableness-extraversion-open personality traits to represent Cluster 5, which is characterized by a combination of high levels of agreeableness, extraversion and open to new experience, a moderate level of conscientiousness and a low level of neuroticism.

Insert Table 6 about here

The five clusters identified above were used as the grouping criterion to explore the effect of psychological differences on users' perceptions of e-quality of and affinity with virtual communities. Consequently, the following null hypothesis is proposed:

H5. There is no significant difference among users belonging to different clusters in terms of their perceptions of e-quality and affinity.

4.3. Results

Table 7 shows the result of the independent samples t test grouped by gender, which suggests that there are no significant differences for all the constructs of e-quality and affinity. Consequently, the null hypothesis H1 is accepted for all the four constructs.

Insert Table 7 about here

The result of one-way ANOVA grouped by age is shown in Table 8. It suggests that there are no significant differences except for system quality of virtual communities (SYSQVC) and service quality of virtual communities (SERQVC). Consequently, the null hypothesis H2 is accepted for 2 out of 4 constructs but rejected in the case of SYSQVC and SERQVC among various age groups. From Table 8, it can be seen that the users being 26-35 years old are most likely to perceive high levels of SYSQVC and SERQVC whereas the users being 46-55 years old are least likely to perceive high levels of SYSQVC and SERQVC.

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Insert Table 8 about here

Table 9 shows the result of one-way ANOVA grouped by position, suggesting that there are no significant differences for all the constructs of e-quality and affinity. Consequently, the null hypothesis H3 is accepted for all the four constructs.

Insert Table 9 about here

Table 10 presents the result of one-way ANOVA grouped by experience with virtual communities, suggesting that there are significant differences for all the constructs of e-quality and affinity. Consequently, the null hypothesis H4 is rejected for all the four constructs. From Table 10, it can be seen that the users with more than 4 years of experience with virtual communities are most likely to perceive high levels of IQVC and SYSQVC whereas the users with less than 1 year of experience with virtual communities are least likely to perceive high levels of IQVC and SYSQVC. In addition, the users with 2-3 years of experience with virtual communities are most likely to perceive high levels of SERQVC and AFFVC whereas the users with less 1 year of experience with virtual communities are least likely to perceive high levels of SERQVC and AFFVC.

Insert Table 10 about here

Table 11 shows the result of one-way ANOVA grouped by the five clusters identified above in terms of personality traits, suggesting that there are significant differences except for SERQVC. Consequently, the null hypothesis H5 is rejected for 3 out of the 4 constructs but accepted in the case of SERQVC. The results imply that users' perceptions of IQVC, SYSQVC and AFFVC are significantly different across the five personality trait clusters. In contrast, users' perceptions of service quality are not significantly different across different clusters of personality traits. From Table 11, it can be seen that the mean scores of IQVC, SYSQVC and AFFVC for users with intensive personality traits is the highest while the mean scores of IQVC, SYSQVC and AFFVC for users with non-intensive personality traits is the lowest, which suggests that users with intensive personality traits are most likely to perceive high levels of IQVC, SYSQVC and AFFVC whereas users with non-intensive personality traits are least likely to perceive high levels of IQVC, SYSQVC and AFFVC.

Insert Table 11 about here

5. Discussion and implications

Following the information systems (IS) success model, this study examines the exact nature of users' perceptions of e-quality of and affinity with virtual communities from both physical and psychological perspectives. The effect of individual differences in terms of gender, age, position, experience with virtual communities as well as the five personality trait clusters on users' perceptions of e-quality of and affinity with virtual communities was explored. We believe the findings of this study have important implications.

For gender, we find that there are no significant differences in terms of information quality, system quality, service quality and affinity (see Table 7), inconsistent with prior studies which argue that males consider system quality to be a significant factor of blog stickiness whereas females are interested in content quality (Lu & Lee, 2010), and that males are reported to have a higher rating than females regarding perceptions of Wikipedia's information quality (Lim & Kwon, 2010).

For age, significant differences regarding users' perceptions of system quality and service quality were found (see Table 8). The users being 46-55 years old are least likely to perceive high levels of SYSQVC and SERQVC. For this group of relatively older users, they might hold the belief that virtual communities are informal information sources whose quality can't be guaranteed. They tend to seek the most credible and authoritative sources in the workplace, thus ignoring virtual communities. In this situation, it is necessary for virtual community practitioners to pay more attention to older users and help them to seek information in this platform given the acknowledgment of usefulness, quality, reliability and knowledge value of ongoing virtual communities (Fallis, 2008; Stvilia, Twidale, Smith, & Gasser, 2008). Meanwhile, in order to attract older users, virtual community practitioners should pay more attention to ease of use of virtual communities given the broad acceptance of this construct as a key factor to determine usage behavior (Venkatesh et al., 2003; Zha, Li, & Yan, 2013). For position, Lu and Lee (2010) suggest students mainly focus on content quality whereas non-students care about the quality of context and system in addition to content. In the current study, we targeted users of virtual communities who study or work in Chinese universities. Our study suggests that no significant difference is found among undergraduate, master student, doctoral student and faculty regarding their perceptions of e-quality and affinity (see Table 9).

In terms of users' experience with virtual communities, there are significant differences regarding users' perceptions of e-quality of and affinity with virtual communities (see Table 10). The findings show that users with less than 1 year of experience with virtual communities are least likely to perceive high levels of e-quality of and affinity with virtual communities. This might attribute to their unfamiliarity with virtual communities. Even though information seekers are driven by searching for quality information to satisfy their information needs (Xu, Tan, & Yang, 2006; Cho & Lee, 2008), they tend to select information sources within the limit of their competence (Savolainen, 1995) so that they can invest the least effort and reap the highest efficiency. Virtual communities emphasize user-generated content, thus providing phenomenal information through collective intelligence on the one hand. On the other hand, the unfiltered mechanism can possibly result in the dissemination of unreliable information (Metzger & Flanagin, 2011), thus burdening the less experienced users who need to spend considerable efforts in seeking the needed information and evaluating its quality in the context of virtual communities. For system quality, it measures technical success of interaction with the system (DeLone & McLean, 1992, 2003). Less experienced users who are unfamiliar with virtual communities tend to perceive difficulties in making clear the navigation and layout of the system in the initial stage. Therefore, we recommend that virtual community practitioners should pay special attention to new entrants of virtual communities to help them to appreciate and enjoy the information and service provided by the virtual community and enhance their capabilities to interact with the system per se. Only in this way, can the sustainable development of virtual communities be maintained by attracting an increasing number of new users.

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The cluster analysis yields a better understanding of the combination of different levels of distinct personality traits. For the five personality trait clusters, significant differences were found regarding users' perceptions of e-quality and affinity except for service quality (see Table 11), which suggests that users' perceptions of information quality, system quality and affinity depend on the combination of personality traits. The findings show that the users with intensive personality traits (Cluster 4) are most likely to perceive high levels of information quality, system quality and affinity while the users with non-intensive personality traits (Cluster 1) are least likely to perceive high levels of information quality, system quality and affinity. Cluster 1 and Cluster 4 represent two extreme of the personality trait combination. Cluster 1 is characterized by the low level of all the five personality traits while Cluster 4 is characterized by the high level of all the five personality traits. Fortunately, this study suggests that 34.7% (124/357) of respondents fell into Cluster 4. However, there are still 11.2% (40/357) of respondents fell into Cluster 1. Psychological differences would bring more challenges given that they are difficult to be identified and thus tend to be ignored. We thus recommend that virtual community practitioners should at first recognize the effect of psychological differences on user perceptions of virtual communities in terms of e-quality and affinity, and then learn to identify the users who have non-intensive personality traits. Furthermore, they should help the users with non-intensive personality traits to gradually perceive the information quality and system quality of virtual communities, thus enhancing their affinity with virtual communities. As a result, virtual communities can hopefully have a harmonious and healthy development among users with different personality traits.

This study has its limitation. This study treats virtual communities as a whole and explores user perceptions of e-quality of and affinity with them given that all virtual communities share the same basic premise that they function for their members not only as social settings but also as "information neighborhoods" (Burnett, 2000). We suggest these shared characteristics/features of virtual communities provide the opportunity to conduct data collection across different virtual communities. However, focusing on one specific virtual community would definitely help to eliminate possible influences of different characteristics/features such as different interface designs in different virtual communities.

6. Conclusion

Given individual differences including physical and psychological differences affect the ways people think and respond to the environment (Lu & Lee, 2010), this study investigated the effect of individual differences on users' perceptions of virtual communities in terms of e-quality and affinity. The independent samples t test and one-way ANOVA presented the effect of users' physical differences (e.g., gender, age, position and experience with virtual communities) on their perceptions of e-quality of and affinity with virtual communities. Meanwhile, according to the five clusters identified in terms of personality traits through the cluster analysis, the one-way ANOVA indicated the effect of users' personality trait clusters on their perceptions of e-quality and affinity. Virtual communities increasingly function as an integrated part of the information seeking landscape for users (Ostrander, 2008) who are usually driven by highly personalized information needs to search for quality information. Thus, we believe the findings of the current study will help practitioners of Chinese virtual communities to better understand users' different cognitions of virtual communities as information sources from a holistic view of sociodemographic and

psychological characteristics in terms of e-quality and affinity so that they could efficiently identify the personalized and diversified information needs of their users and then reinforce the e-quality to achieve a sustainable success of virtual communities. Furthermore, user information behavior is a dynamic process within the virtual community context. A longitudinal study would provide more insights into the development of users' mental models regarding information behavior in the context of virtual communities, thus usefully complementing the current study.

Acknowledgements

Insert Appendix about here

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Table 1

Demographic information of survey respondents.

Category	Item	Frequency	Percent (%)
Gender	Male	177	49.6
	Female	180	50.4
	Total	357	100
Age	18-25	251	70.3
	26-35	77	21.6
	36-45	22	6.2
	46-55	7	2.0
	>55	0	0
	Total	357	100
Position	Undergraduate	145	40.6
	Master student	116	32.5
	Doctoral student	44	12.3
	Faculty	52	14.6
	Total	357	100
Experience with virtual communities	Less than 1 year	92	25.8
	1-2	50	14.0
	2-3	51	14.3
	3-4	50	14.0
	More than 4 years	114	31.9
	Total	357	100

Table 2

Overview of measurement model.

Constructs	Items	AVE	CR	Cronbach's Alpha
Information quality of virtual communities (IQVC)	3	0.648	0.846	0.727
System quality of virtual communities (SYSQVC)	3	0.750	0.900	0.833
Service quality of virtual communities (SERQVC)	4	0.678	0.894	0.843
Affinity with virtual communities (AFFVC)	3	0.761	0.905	0.842
Extraversion (EXTRA)	3	0.714	0.882	0.802
Agreeableness (AGREE)	3	0.758	0.903	0.840
Openness to new experience (OPEN)	3	0.796	0.921	0.875
Conscientiousness (CONSC)	2	0.778	0.874	0.743
Neuroticism (NEURO)	2	0.720	0.833	0.706

Table 3

Square roots of AVE and correlations between constructs.

Construct	AFFVC	AGREE	CONSC	EXTRA	IQVC	NEURO	OPEN	SERQVC	SYSQVC
AFFVC	**0.872**								
AGREE	0.162	**0.870**							
CONSC	0.125	0.277	**0.882**						
EXTRA	0.118	0.568	0.235	**0.845**					
IQVC	0.489	0.139	0.119	0.127	**0.805**				
NEURO	0.129	0.256	0.338	0.217	0.134	**0.848**			
OPEN	0.133	0.558	0.282	0.508	0.084	0.228	**0.892**		
SERQVC	0.541	0.137	0.161	0.097	0.656	0.036	0.088	**0.823**	
SYSQVC	0.522	0.164	0.110	0.119	0.746	0.105	0.132	0.768	**0.866**

Note: Diagonal elements in bold are square roots of AVE of each construct.

Table 4

Item loadings and cross loadings.

Item	AFFVC	AGREE	CONSC	EXTRA	IQVC	NEURO	OPEN	SERQVC	SYSQVC
AFFVC1	**0.900**	0.200	0.074	0.108	0.424	0.103	0.124	0.477	0.432
AFFVC2	**0.913**	0.224	0.156	0.159	0.431	0.176	0.166	0.488	0.466
AFFVC3	**0.800**	-0.026	0.097	0.030	0.429	0.050	0.048	0.451	0.476
AGREE1	0.162	**0.915**	0.256	0.469	0.126	0.208	0.449	0.129	0.157
AGREE2	0.151	**0.907**	0.282	0.497	0.122	0.281	0.478	0.130	0.152
AGREE3	0.101	**0.782**	0.177	0.543	0.116	0.181	0.561	0.094	0.114
CONSC1	0.098	0.250	**0.801**	0.235	0.068	0.272	0.292	0.125	0.077
CONSC2	0.121	0.251	**0.956**	0.201	0.127	0.322	0.238	0.156	0.110
EXTRA1	0.094	0.354	0.096	**0.802**	0.026	0.138	0.383	0.043	0.085
EXTRA2	0.156	0.427	0.236	**0.879**	0.169	0.181	0.439	0.123	0.110
EXTRA3	0.035	0.662	0.244	**0.852**	0.103	0.228	0.462	0.065	0.103
IQVC1	0.439	0.249	0.174	0.173	**0.758**	0.171	0.168	0.550	0.515
IQVC2	0.350	0.031	0.045	0.044	**0.823**	0.031	0.023	0.492	0.668
IQVC3	0.398	0.070	0.077	0.097	**0.831**	0.131	0.022	0.546	0.612
NEURO1	0.044	0.093	0.233	0.241	0.064	**0.686**	0.146	0.028	0.051
NEURO2	0.138	0.272	0.332	0.191	0.139	**0.984**	0.226	0.035	0.109
OPEN1	0.111	0.524	0.291	0.462	0.118	0.238	**0.923**	0.101	0.155
OPEN2	0.065	0.453	0.222	0.519	0.030	0.156	**0.821**	0.067	0.081
OPEN3	0.159	0.512	0.238	0.419	0.062	0.202	**0.928**	0.066	0.107
SERQVC1	0.413	0.090	0.094	0.076	0.622	-0.018	0.080	**0.803**	0.787
SERQVC2	0.514	0.169	0.132	0.100	0.598	0.054	0.106	**0.860**	0.651
SERQVC3	0.416	0.130	0.185	0.127	0.440	0.075	0.074	**0.816**	0.522
SERQVC4	0.432	0.056	0.133	0.013	0.462	0.017	0.020	**0.813**	0.516
SYSQVC1	0.417	0.081	0.152	0.060	0.702	0.099	0.107	0.652	**0.840**
SYSQVC2	0.472	0.172	0.067	0.131	0.620	0.092	0.092	0.660	**0.883**
SYSQVC3	0.468	0.174	0.065	0.119	0.615	0.083	0.143	0.683	**0.876**

Table 5

Cluster center and comparison.

Personality Traits	Cluster groups	Mean	Std. Deviation	F	Sig.	Multiple Comparisons
AGREE	Cluster 1 (n=40)	4.001	.884	96.900	**.000*****	1-2***, 1-3***,
	Cluster 2 (n=35)	5.384	.782			1-4***, 1-5***,
	Cluster 3 (n=85)	5.265	.677			2-4***, 2-5***,
	Cluster 4 (n=124)	6.148	.617			3-4***, 3-5***
	Cluster 5 (n=73)	6.196	.572			
CONSC	Cluster 1 (n=40)	3.756	.807	73.934	**.000*****	1-2***, 1-3***,
	Cluster 2 (n=35)	5.631	.786			1-4***, 1-5*,
	Cluster 3 (n=85)	4.627	.825			2-3***, 2-5***,
	Cluster 4 (n=124)	5.904	.751			3-4***, 4-5***
	Cluster 5 (n=73)	4.283	1.160			
EXTRA	Cluster 1 (n=40)	3.519	.686	97.637	**.000*****	1-2***, 1-3***,
	Cluster 2 (n=35)	4.642	.989			1-4***, 1-5***,
	Cluster 3 (n=85)	4.219	.646			2-3*, 2-4***,
	Cluster 4 (n=124)	5.551	.741			2-5***, 3-4***,
	Cluster 5 (n=73)	5.652	.711			3-5***
NEURO	Cluster 1 (n=40)	3.552	.753	65.269	**.000*****	1-2***, 1-3***,
	Cluster 2 (n=35)	5.404	.947			1-4***, 2-3**,
	Cluster 3 (n=85)	4.784	.863			2-5***, 3-4***,
	Cluster 4 (n=124)	5.670	.854			3-5***, 4-5***
	Cluster 5 (n=73)	3.959	1.128			
OPEN	Cluster 1 (n=40)	3.769	.716	153.444	**.000*****	1-3***, 1-4***,
	Cluster 2 (n=35)	3.850	.771			1-5***, 2-3***,
	Cluster 3 (n=85)	5.240	.656			2-4***, 2-5***,
	Cluster 4 (n=124)	6.080	.558			3-4***, 3-5***
	Cluster 5 (n=73)	5.956	.760			

Note: *p<0.05; **p<0.01; ***p<0.001; Insignificant comparisons are omitted.

Table 6

Clusters' patterns of personality traits.

	N	AGREE	CONSC	EXTRA	NEURO	OPEN
Cluster 1: Non-intensive personality traits	40	Low	Low	Low	Low	Low
Cluster 2: Conscientiousness-Neuroticism personality traits	35	Middle	High	Middle	High	Low
Cluster 3: In-between personality traits	85	Middle	Middle	Middle	Middle	Middle
Cluster 4: Intensive personality traits	124	High	High	High	High	High
Cluster 5: Agreeableness-Extraversion-Open personality traits	73	High	Middle	High	Low	High

Table 7

Independent samples t test grouped by gender.

Constructs	Gender	N	Mean	Std. Deviation	t	Sig. (2-tailed)
IQVC	Male	177	4.062	1.153	-.901	.368
	Female	180	4.172	1.160		
SYSQVC	Male	177	4.013	1.228	-1.077	.282
	Female	180	4.150	1.176		
SERQVC	Male	177	4.070	1.256	-1.143	.254
	Female	180	4.215	1.137		
AFFVC	Male	177	3.834	1.450	-1.366	.173
	Female	180	4.043	1.447		

Table 8

One-way ANOVA grouped by age.

Constructs	Age	N	Mean	Std. Deviation	F	Sig.
IQVC	18-25	251	4.129	1.136	1.809	.145
	26-35	77	4.194	1.201		
	36-45	22	4.027	0.830		
	46-55	7	3.150	1.921		
SYSQVC	18-25	251	4.095	1.187	4.325	**.005****
	26-35	77	4.202	1.205		
	36-45	22	4.015	0.906		
	46-55	7	2.524	1.661		
SERQVC	18-25	251	4.110	1.185	3.920	**.009****
	26-35	77	4.396	1.140		
	36-45	22	4.032	1.159		
	46-55	7	2.890	1.649		
AFFVC	18-25	251	4.004	1.434	2.069	.104
	26-35	77	3.966	1.453		
	36-45	22	3.366	1.373		
	46-55	7	3.130	1.900		

Note: *p<0.05; **p<0.01; ***p<0.001.

Table 9

One-way ANOVA grouped by position.

Constructs	Position	N	Mean	Std. Deviation	F	Sig.
IQVC	Undergraduate	145	4.005	1.090	.989	.398
	Master student	116	4.219	1.204		
	Doctoral student	44	4.068	1.220		
	Faculty	52	4.244	1.172		
SYSQVC	Undergraduate	145	3.991	1.147	.492	.688
	Master student	116	4.149	1.231		
	Doctoral student	44	4.102	1.348		
	Faculty	52	4.169	1.179		
SERQVC	Undergraduate	145	4.019	1.115	1.540	.204
	Master student	116	4.201	1.233		
	Doctoral student	44	4.083	1.271		
	Faculty	52	4.413	1.257		
AFFVC	Undergraduate	145	3.934	1.436	.379	.768
	Master student	116	4.040	1.381		
	Doctoral student	44	3.824	1.543		
	Faculty	52	3.828	1.581		

Table 10

One-way ANOVA grouped by experience with virtual communities.

Constructs	VC Experience	N	Mean	Std. Deviation	F	Sig.
IQVC	Less than 1 year	92	3.759	1.332	3.943	**.004****
	1-2	50	4.071	0.975		
	2-3	51	4.205	1.144		
	3-4	50	4.124	1.071		
	More than 4 years	114	4.384	1.054		
SYSQVC	Less than 1 year	92	3.640	1.304	6.849	**.000*****
	1-2	50	3.942	0.990		
	2-3	51	4.181	1.150		
	3-4	50	4.037	1.152		
	More than 4 years	114	4.476	1.127		
SERQVC	Less than 1 year	92	3.781	1.272	4.500	**.001****
	1-2	50	4.040	0.887		
	2-3	51	4.437	1.121		
	3-4	50	4.038	1.127		
	More than 4 years	114	4.396	1.244		
AFFVC	Less than 1 year	92	3.105	1.383	17.926	**.000*****
	1-2	50	3.438	1.327		
	2-3	51	4.486	1.177		
	3-4	50	4.243	1.380		
	More than 4 years	114	4.455	1.328		

Note: *p<0.05; **p<0.01; ***p<0.001.

Table 11

One-way ANOVA grouped by personality trait conditions.

Constructs	Cluster groups	N	Mean	Std. Deviation	F	Sig.
IQVC	Cluster 1	40	3.839	.931	3.443	**.009****
	Cluster 2	35	4.071	1.021		
	Cluster 3	85	4.050	1.007		
	Cluster 4	124	4.399	1.290		
	Cluster 5	73	3.891	1.177		
SYSQVC	Cluster 1	40	3.695	1.021	3.293	**.011***
	Cluster 2	35	4.025	1.096		
	Cluster 3	85	4.045	1.039		
	Cluster 4	124	4.337	1.341		
	Cluster 5	73	3.932	1.210		
SERQVC	Cluster 1	40	3.921	.881	1.627	.167
	Cluster 2	35	4.148	1.069		
	Cluster 3	85	4.056	1.002		
	Cluster 4	124	4.351	1.390		
	Cluster 5	73	4.011	1.239		
AFFVC	Cluster 1	40	3.506	1.222	2.810	**.025***
	Cluster 2	35	4.076	1.350		
	Cluster 3	85	3.825	1.292		
	Cluster 4	124	4.274	1.615		
	Cluster 5	73	3.677	1.390		

Note: *$p<0.05$; **$p<0.01$; ***$p<0.001$.

Appendix: Constructs and items

Constructs	Items
Information quality of virtual communities (adapted from Zhou, 2011; Wixom and Todd, 2005)	1. The information in virtual communities is up-to-date. 2. The information in virtual communities is accurate. 3. The information in virtual communities is comprehensive.
System quality of virtual communities (adapted from Zhou, 2011; Wixom and Todd, 2005)	1. Virtual communities are reliable. 2. The navigation of virtual communities is effective. 3. The layout of virtual communities is clear.
Service quality of virtual communities (adapted from Zhou, 2012; Zhou, 2011)	1. Virtual communities provide dependable services. 2. Virtual communities provide prompt services. 3. Virtual communities provide personalized services. 4. Virtual communities provide professional services.
Affinity with virtual communities (adapted from Aldás-Manzano et al., 2009)	1. Seeking information in virtual communities is one of my main daily activities. 2. Virtual communities are important in my life. 3. I cannot go for several days without seeking information in virtual communities.
Extraversion (adapted from Gosling et al., 2003; Zhou and Lu, 2011)	1. I am talkative. 2. I am energetic. 3. I am passionate to others.
Agreeableness (adapted from Gosling et al., 2003; Zhou and Lu, 2011)	1. I have a forgiving personality. 2. I am friendly to others. 3. I like to cooperate with others.
Openness to new experience (adapted from Gosling et al., 2003; Zhou and Lu, 2011)	1. I am curious with novelty. 2. I like to present some new ideas. 3. I like to experience novelty.
Conscientiousness (adapted from Gosling et al., 2003; Zhou and Lu, 2011)	1. I first make plans and then commit to them. 2. I am careful with fulfilling tasks throughout the whole process. 3. I am careless with fulfilling tasks throughout the whole process. (Dropped)
Neuroticism (adapted from Gosling et al., 2003; Zhou and Lu, 2011)	1. I am easily anxious. 2. I am somewhat worried.

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