Information Seeking and Sharing in Virtual Communities: A Case Study of Chinese IT Professionals

Yuelin Li
Department of Information Resources Management, Business School, Nankai University, Tianjin, China, 300071
yuelinli@nankai.edu.cn

Xiaofeng He
Department of Information Resources Management, Business School, Nankai University, Tianjin, China, 300071
hexiaofeng@mail.nankai.edu.cn

Die Hu
School of Information and Library Science, North Carolina University at Chapel Hill, Chapel Hill, 27599
mandihu@live.unc.edu.cn

ABSTRACT
The study aims to examine information seeking and sharing behavior of IT professionals in a virtual community (VC). In total, 200 threads with 1623 postings were extracted from ChinaUnix.net, an IT VC. A content analysis was performed and descriptive statistical analysis was conducted. The study identified four types of information seeking and sharing activities: resource sharing, experience sharing, asking questions, and asking for resources. The results indicate that asking questions is the dominant activity in this virtual community (VC), while experience sharing threads are browsed most in comparison to other threads. Browsing information in the VC is much more preferred by the users than contributing information to the VC. The important information behavior chain in this VC consists of asking, responding, interacting, uploading, linking, posting, and browsing. Interacting is an important vehicle for effective information exchange. The study helps people understand how the users of a VC seek and share information. The study reveals typical information seeking and sharing activities as well as behavior characteristics that support users’ engagement in a VC; it also identifies an information seeking and sharing chain in that context. It also adds new knowledge to users’ information seeking and sharing behavior in the information science area. The study could help designers develop and improve the design of VCs as well as help administrators improve and maintain an active and effective VC.

Keywords
IT Professionals; professional virtual communities; information seeking behavior; information sharing behavior.

INTRODUCTION
Context has been recognized as an important factor that shapes users’ information seeking behavior (Cool & Spink, 2002; Courtright, 2007). According to Taylor (1991), there are various information use environments (IUEs). It is necessary to examine information seeking behavior in different environments in order to comprehensively understand human information seeking behavior. With the development of the Internet, some new IUEs have emerged and drawn attention, such as virtual communities (VCs). These VCs serve different users with different tasks, situations, and information needs. A few examples of different types of VCs include BBS, discussion forums, and social network websites. A virtual community is a platform that provides basic functionality in information exchange and sharing. This inspires many researchers to explore how people conduct information activities in a virtual community, specifically information seeking and sharing. Hersberger et al. (2007) proposed a conceptual framework that recognized the effective contexts of VCs. Adamic et al. (2008) attempted to understand Yahoo Answers (YA)’ knowledge sharing activities. Based on content characteristics and patterns of interaction among the users, they characterized the discussion in YA into three clusters: discussion forums that focus on general questions, seeking and providing advice and commonsense expertise, and questions with factual answers. Some studies went further to probe users’ intention to continuously contribute to a virtual community (Wise et al., 2006; Chen et al., 2013), while others attempted to reveal what factors motivated users’ information sharing or seeking activities in virtual communities (Oh, 2012; Li & Zhou, 2011). There are also studies that examined how specific user groups exchanged, sought, or shared information in virtual communities. Specific user groups that were studied include investors (O’Connor, 2013), online health respondents (Oh, 2012), consumers (Hennig-Thurau & Walsh, 2003; Hennig-Thurau et al., 2004; Lea et al., 2006), students (Cho et al., 2002), emergency clinicians (Curran, et al., 2009), tourists (Wang et al., 2002; Wang & Fesenmaier, 2004), software developers (King, 1994), and so forth. Along this
line, the current research aims to examine information seeking and sharing behavior of IT professionals in professional virtual communities (PVCs).

IT professionals face constant pressure since the IT market is constantly changing. New challenges and problems continuously emerge and the context pushes them to keep updating their knowledge. As a result, they must keep up-to-date with current IT developments in order to solve different issues in practice. To keep updated, VCs for IT people have been developed and played an important role in IT-related information seeking and sharing. However, though some user groups have been examined, it is still unclear how IT professionals use VCs to share and acquire information and knowledge in related areas. Due to VCs’ significant role in promoting information seeking and sharing in IT area, it is necessary to explore how users effectively share and seek useful information in them. To this end, this study aims to explore how IT professionals seek and share information in virtual communities; specifically, it examines the following two questions:

Q1. What activities do IT professionals engage in an IT professional VC?

Q2. What characteristics do they present when seeking and sharing information in an IT professional VC?

Information sharing and seeking are prevalent activities in VCs. This study is concerned with how they engage in different information activities in VCs.

This study could help understand IT professionals’ information seeking and sharing behavior in VCs. In addition, it could help designers to improve the design of such VCs, and administrators to improve information exchange in the community.

LITERATURE REVIEW

Virtual communities have been examined in different areas, such as communication, information management, information science, and so forth. This section reviews relevant studies and provides a theoretical framework and empirical foundation for the current study.

General motivation to participate in VCs

General motivation to participate in VCs has been widely explored. Information sharing on the Internet by users is a natural, identifiable, and highly social behavior (Hersberger et al., 2005). In any type of VC, the important factor that motivates users to participate in a community is the relevance of the content to the users’ interests (Wise et al., 2006). Hersberger et al. (2005) identified the following motivations for users’ information sharing on the Internet:

- It feels good when the shared information helps others;
- they are keen on the information content itself;
- the way of sharing is very convenient;
- it is a race to find information and share with others.

To specifically examine the motives, Wise et al. (2006) conducted two experiments to explore how moderation, response rate, and message interactivity influenced users’ participation in an online community. The results indicated that moderation could predict users’ intent to participate in online communities; however, the response rate and message interactivity individually could not be predicted. The interaction effect of response rate and message interactivity on users’ intent was significant. That is, in the slow response rate condition, participants reported greater intent to participate in online communities when messages were interactive and vice versa. The results indicated that both structural features of interface and content features of interactions affected the user’s intention to participate in online communities.

Learning and sharing are important motives for users to participate in VCs, especially in professional VCs. Chen and Huang (2010) developed a research model composed of contextual and individual factors. Based on the data collected from two communities, they tested the model and found that the norm of reciprocity, interpersonal trust, knowledge sharing self-efficacy, and perceived relative advantage significantly affected knowledge sharing behavior in PVCs.

However, many VCs failed (Phang et al., 2009). Researchers investigated the reasons for failure and explored how to attract users to continuously contribute and seek information in a VC. Chen (2007) examined the factors that influenced users’ continued intentions to participate in communities using a survey. A theoretical model composed of contextual and technological factors was developed to explain members’ continued intentions in PVCs. The results showed that social interaction ties expectation, knowledge quality expectation, and system quality expectation positively influenced their corresponding confirmation. The three factors further impacted post-usage social interaction ties and website use satisfaction, both of which directly affected users’ continuance intention. Chen (2007) and Phang et al. (2009) also studied the failure of VCs that could not sustain knowledge sharing and learning in the communities. Based on a social-technical perspective, they attempted to address how members’ perception of usability and sociability of an online community system could be used to promote both knowledge contribution and seeking activities. The study highlighted the significance of usability, and further identified two important aspects of usability: the ease of use and system reliability. However, knowledge tracking fulfillment was more important in affecting the users’ knowledge contribution. Sociability also influenced knowledge seeking and contribution in VCs. These studies suggest that sustainability has been a major concern for VCs.
Different user groups’ information seeking and sharing in VCs

Information seeking and sharing behavior in VCs have been investigated with regard to different user groups. The following section reviews related studies.

IT-related users in VCs

King’s study (1994) found evidence that engineers, such as systems developers, spent 40%–66% of their time in communication with peers in order to get input to their work and fully complete it. Several studies examined IT professionals on how they seek and share information in virtual communities. Constant et al. (1996) conducted an empirical study on 55 information seekers and 295 information providers from Tandem Computers Incorporated internal corporate help line. They found that the system was effective; information seekers received useful technical advice, with 49% of the advice solving their problems.

Researchers also studied software developers. Hertel et al. (2003) conducted an online survey to examine the motivation of software developers in open source projects to participate in VCs. The survey was based on two theoretical models: the Extended Klandermans Model (EKM) (Klandermans, 1996; Simon et al., 1998) and the VIST model (Hertel, 2003). The former refers to four motivational components, i.e. collective motives, norm-oriented motives, reward motives, and identification processes. These explain the voluntary action in social movements. The VIST model is composed of four main components: valence, instrumentality, self-efficacy, and trust. These all motivate individuals to work in a virtual team. This study identified seven influential factors that motivated software developers to share and seek information in the Linux kernel community, including their identification as a Linux developer or user, pragmatic motives to improve own software, their tolerance of time investment, and so forth.

The usage of IT information has also been examined. By using a mixed qualitative and quantitative method, Hansen (2009) analyzed the conversation reuse in an online technical support community. He found that successful conversations had the same characteristics, such as highly personal, immediate, and socially engaging. The study identified several important characteristics that had implications for the reuse of postings:

- The discussion is shaped by the immediate and highly personalized information needs of requestors.
- Postings on comments, techniques, and resources of general interest, as well as social exchanges.
- Questions and replies often include links to outside resources. (Hansen, 2009, p.160)

These characteristics identified could inform VCs on improving its sustainability.

Other user groups in VCs

In addition to IT professionals, other user groups have been examined. Through a content analysis of an online cancer support group, Klemm et al. (1998) identified four categories that accounted for approximately 80% of responses across groups. The four categories are information giving and seeking, statements of encouragement and support, statements of personal opinions, and statements of personal experience. Oh (2012) distributed an online survey questionnaire to top and recent respondents to investigate their demographics, areas of health expertise, and other characteristics related to answering behaviors online. She identified ten motives leading users to participate in the online answering community: enjoyment, efficacy, learning, personal gain, altruism, community interest, social engagement, empathy, reputation, and reciprocity. She further examined the degree of importance of these motives by a survey. The study found that altruism was the most influential motivation, while personal gain was the least. Enjoyment and efficacy were more influential than other social motivations, such as reputation or reciprocity.

Concerned with non-work contexts, Savolainen (2001) conducted an empirical study in a Finnish newsgroup that focused on the potential and problems of the Internet newsgroups as an information source for consumer information seeking. He specifically examined the threads, nature of the communication, consumer information needs, information sources, and channels. The study found that the online newsgroup was a good source for asking for advice and help from participants. Weak ties do not always work in this newsgroup. The study also found that unspecific and vague questions did not effectively motivate the potential help providers. Usually, information providers preferred their own experience as an information source. It is interesting that there was practically no dialogue between information seekers and providers; information seekers rarely gave back to help providers and let the providers know whether the problem was solved or not. This study revealed users’ non-work related information seeking behavior characteristics in a virtual community.

Electronic word-of-mouth (eWOM) is a type of information sharing among consumers on their opinions and experiences with goods and services. Hennig-Thurau et al. (2004) explored the motives of consumers’ online articulation. The results indicated that consumers’ desire for social interaction, desire for economic incentives, their concern for other consumers, and the potential to enhance their own self-worth are the primary factors leading to eWOM behavior. Hung and Li (2007) analyzed computer-mediated data and conducted face-to-face interviews with beauty product enthusiasts in China to understand eWOM in a consumption-interest virtual community. They identified four categories of response: source of social capital, brand choice facilitation, persuasion knowledge development, and consumer reflexivity. Zhao et al. (2010) focused on investigation eWOM in China. They found that altruism, positive expression, self-efficacy, belongingness,
Antweiller and Frank (2004) investigated the effect of investors’ online discussion on the markets based on the research of 1,500,000 postings. The study found that investors’ online discussion directly related to market changes. Message postings did help predict volatility both at daily frequencies and also within the trading day. Park et al. (2013) analyzed 502 postings on South Korea's biggest financial information section. The study explored how users valued information from communities and how that affected their behavior. The study found that investors exhibited confirmation bias, whereby they preferentially treated messages that supported their prior beliefs. He found that investors were more willing to find the information they had identified previously. O'Connor (2013) reported an analysis of information sharing and use in three investment discussion forums by coding 1,787 threads based on previously developed typologies for Internet-based discussion. The study analyzed the citations in their context and categorized the sources into different types to identify a high degree of collaborative information behavior. The study also recognized several information sources that may compromise investors’ decision making, which include heavy reliance on personal sources of information, commercially sponsored information, blogs, and investor guru sites.

Based upon core characteristics of VCs and the fundamental needs of community members, Wang et al. (2002) developed a theoretical model to explain the user’s activities in VCs. This model indicates three kinds of needs in VCs: functional needs, psychological needs, and social needs. Wang and Fesenmaier (2004) then conducted a survey of 322 users from a virtual travel community operated by a large US-based travel company with over 150,000 community members to test the model. The results indicated that participation in the travel community was driven mostly by social and hedonic benefits. Members would not spend a lot of time to perform concrete task-oriented activities in online communities. Instead, they would rather spend time in socially interactive activities with other members. To investigate the role of Yammer, an enterprise social media service used by more than 100,000 companies, Riemer and Scifleet (2012) analyzed 1,809 messages extracted from the dataset provided by Deloitte. They identified seven genres of communicative practices in this VC, such as discussion, sharing, update, problem solving and advice, social and praise, idea generation, and others. The study reveals some prevalent user behavior in a VC.

A summary of literature review

Previous studies have recognized motivation of users in VCs from different perspectives. In general, personal interest, expectation of information exchange, altruism, self-efficacy, learning, knowledge upgrading, and so forth motivate users to seek and share information in VCs. Failure of some VCs happen and is a big concern of researchers. Different factors such as message interactivity, moderation, usability, and sociability can affect users’ continuance intention to participate in VCs. With regard to different user groups, studies have examined their characteristics in different VCs. Users use VCs as a platform to share and seek information, as well as to promote learning and knowledge updating in different domains, especially in PVCs. However, considering the influence of different contexts on users’ information seeking behavior, studies on specific user groups’ information activities and information seeking and sharing behavior are still incomplete. Inspired by previous studies, this study aims to investigate IT professionals’ information seeking and sharing in VCs. Previous studies indicate that analyzing postings is an effective way to reveal users’ information seeking and sharing behavior in VCs. This method was employed in the current study.

RESEARCH METHOD

According to Phang et al. (2009), the main goal of virtual communities is to facilitate information sharing and to promote learning and users’ career development among the communities. For that purpose, information exchange by posting to VCs is imperative. Hence, we conducted a content analysis of the postings in a virtual community to address the research questions.

Sampling

A sample was extracted from a VC called ChinaUnix.net, which was developed in 2001 and is a discussion forum and the biggest Linux/Unix technical VC in China. A great number of users participate in the discussion of the issues related to Linux/Unix operation systems, C/C++, programing, network technology, kernel technology, server storage technology, and so forth. This community has many different discussion boards. We selected “Server and Application”, “Linux Novices”, “Linux Systems Management”, and “C/C++,” as they are the most popular boards in this community. For example, the ‘Linux Novice’ board has over 180,000 threads, and has provided huge information resources for IT professionals. Due to the constraint of time and resources, we decided to select parts of threads from these four boards to analyze in this study. For currency (in terms of data collection), we selected recent postings, which were posted from March 15th, 2013 to March 30th, 2013. In order to observe users’ information seeking and sharing, we excluded the threads that did not receive responses from users. In addition, discussions prompted by administrators on how to manage the community, postings asking for voting, announcements, and participation of discussion with a prize or reward were also excluded. The reasoning behind this is that these types of discussions are not appropriate with respect to the purpose of the study. We then selected 200 threads (a thread is composed of a main posting and associated responses) in sequence from the four boards (with 50 threads from each). Overall, there are 1623 postings for further analysis.
Data analysis

The data was analyzed via open coding. After the first-round open coding, we examined the codes one by one, categorized them into different categories, and labeled the categories based on content characteristics and users’ behavior. The second-round coding then followed in order to ensure that the categorization was sufficient and the label was appropriate. Thereafter, a descriptive statistical analysis was performed to further analyze the characteristics of the postings with regard to different categories. This study examines the characteristics of users’ information seeking and sharing behavior by examining:

• Distribution of different types of thread based on the categories
• Total and mean number of postings in terms of each type of thread
• Total and mean frequencies of each type of thread browsed by users
• Duration time of each type of thread before getting first response
• Percentage of solved problems proposed by users
• Number of participants in discussion in VCs

RESULTS

Information seeking and sharing activities

We examined users’ information seeking and sharing behavior by analyzing the characteristics of the threads, i.e. content characteristics and users’ behavior patterns. After the first-round open coding, we categorized the codes based on the two dimensions: content (questions or resources or personal experience) and behavior (asking or sharing). We finally identified four types of threads: resource sharing, experience sharing, asking for resources, and asking questions.

<table>
<thead>
<tr>
<th>Types</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource sharing</td>
<td>Sharing resources about learning materials and software resources</td>
</tr>
<tr>
<td>Experience sharing</td>
<td>Sharing experience in learning and working</td>
</tr>
<tr>
<td>Asking for resources</td>
<td>Asking for resources about learning materials, for example, software resources</td>
</tr>
<tr>
<td>Asking questions</td>
<td>Asking various questions related to IT technologies</td>
</tr>
</tbody>
</table>

Table 1 Types of the threads and explanation

Based on the categorization, we further analyzed users’ information-sharing and -seeking behavior in the VC.

Distribution of the threads

We calculated the number of the threads in each category. Figure 1 shows that most of the threads were aimed at asking users in the community various questions, followed by users sharing their experiences and resources. In general, 84% of the threads (N=163) belonged to ‘asking questions’ and ‘asking for resources’ (we named them ‘asking threads’). This indicates that IT professionals actively sought information in the community by asking questions. The percentage of ‘asking for resources’ is low despite being another way for users to seek information in the community. Therefore, ‘asking’ was an important feature in information seeking in this particular VC.

16% of the threads (N=32) shared learning resources and personal experiences (we named them ‘sharing threads’) in the community. The percentage of ‘sharing threads’ was quite low compared to ‘asking threads’. This suggests that the users in the community favor seeking (by asking) much more than sharing information.

Responding and browsing

A thread is composed of a main posting and associated responses. To observe the popularity of each type of thread and to measure to what extent it has drawn attention of the users in this community, we calculated the total and mean number of postings in each type of thread. We found that most users in the community obtained information by browsing the threads. We then calculated the total and mean frequencies of each type of thread browsed. The result showed to what extent the thread could affect the users.

Table 2 shows that users browsed the 200 threads 405,061 times in total. It also indicates that on average, each thread had 8 postings and had been viewed 2000 times. This result suggests that the community indeed provides an effective platform for information seeking and sharing. Moreover, we found that the total frequencies of the threads browsed were much greater than the total number of postings. To put this in numbers, the total frequencies of threads browsed were almost 250 times more than the total number of postings.
of postings (405,061/1,623). This suggests that the users in this community prefer browsing to posting. In other words, 'taking' information (i.e. browsing others’ postings) is much more preferable to 'giving' information (i.e. actively posting information) in this community.

Further analysis indicated that ‘sharing threads’ were browsed much more frequently than ‘asking threads’ despite there being more ‘asking threads.’ Specifically, ‘experience sharing’ threads were browsed the most, followed by ‘asking questions’ and ‘resource sharing’; ‘asking for resources’ threads were browsed the least. This indicates that ‘experience sharing’ threads gain the most attention in this community. The users are willing to know others’ experience, which may help them to improve their skills or enrich their knowledge. This also indicates the value of experience sharing to IT professionals. Moreover, experience sharing is more popular than resource sharing. In terms of the number of postings, ‘experience sharing’ threads received 7 times more responses than ‘resource sharing’ threads. With regard to the mean frequencies of browsing, ‘experience sharing’ threads were also 5 times more frequently browsed than ‘resource sharing’ threads.

<table>
<thead>
<tr>
<th></th>
<th>TP</th>
<th>MNP</th>
<th>TFB</th>
<th>MFB</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>865/</td>
<td>5.3</td>
<td>104,511/25.8%</td>
<td>641.2</td>
</tr>
<tr>
<td>AFR</td>
<td>29/</td>
<td>5.8</td>
<td>6,019/1.5%</td>
<td>1,203.8</td>
</tr>
<tr>
<td>AT</td>
<td>894/</td>
<td>5.3</td>
<td>110,530/27.3%</td>
<td>657.9</td>
</tr>
<tr>
<td>ES</td>
<td>662/</td>
<td>4.8</td>
<td>264,839/65.4%</td>
<td>13,938.9</td>
</tr>
<tr>
<td>RS</td>
<td>67/</td>
<td>5.2</td>
<td>29,692/7.3%</td>
<td>2,284</td>
</tr>
<tr>
<td>ST</td>
<td>729/</td>
<td>22.8</td>
<td>294,531/72.7%</td>
<td>9,204.1</td>
</tr>
<tr>
<td>Total</td>
<td>1623/</td>
<td>8.1</td>
<td>405,061/2,025.3</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Postings and times of threads browsed
(Notes: AQ: asking question; AFR: asking for resources; AT: asking threads; ES: experience sharing; RS: Resource sharing; ST: Sharing threads; TP: total postings; MNP: Mean number of postings; TFB: total frequency of threads browsed; MFB: Mean frequency of threads browsed)

There is also a large difference between the mean number of posts for ‘asking threads’ to ‘sharing threads’ as Table 2 shows (5 vs. 23). The mean number of responses to ‘sharing threads’ is almost 5 times more than those to ‘asking threads’. In addition, we found that the times of browsing of ‘sharing threads’ is 14 times more than that for ‘asking threads’ (9,204 vs. 658). This indicates that actively shared information attracts much more attention in comparison to asking for information, though the number of ‘sharing threads’ are much less than ‘asking threads.’ This suggests that in VCs, users prefer to obtain information rather than contribute information to others.

<table>
<thead>
<tr>
<th></th>
<th>1-2 days</th>
<th>2-7 days</th>
<th>7-14 days</th>
<th>2 weeks – 6 month</th>
<th>Over half a year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>56/ 34.4%</td>
<td>38/ 23.3%</td>
<td>14/ 8.6%</td>
<td>29/ 17.8%</td>
<td>26/ 15.9%</td>
<td>163</td>
</tr>
<tr>
<td>AFR</td>
<td>1/20% 0</td>
<td>1/20% 0</td>
<td>1/20% 0</td>
<td>2/ 40%</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>AT</td>
<td>57/ 33.9%</td>
<td>38/ 22.6%</td>
<td>15/ 8.9%</td>
<td>30/ 17.9%</td>
<td>28/ 16.7%</td>
<td>168</td>
</tr>
<tr>
<td>ES</td>
<td>1/5.3% 1/7.3%</td>
<td>1/5.3%</td>
<td>2/ 10.5%</td>
<td>14/ 73.6%</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>RS</td>
<td>3/ 23.1%</td>
<td>1/ 7.7%</td>
<td>0 2/ 15.4%</td>
<td>7/ 53.8%</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>4/ 12.5%</td>
<td>2/ 6.3%</td>
<td>1/ 3.1%</td>
<td>4/ 12.5%</td>
<td>21/ 65.6%</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>61/ 30.5%</td>
<td>40/ 20%</td>
<td>16/ 8%</td>
<td>34/ 17%</td>
<td>49/ 24.5%</td>
<td>200</td>
</tr>
</tbody>
</table>

Table 3. Duration time before getting the first response

We measured the length of time between a main posting and the first response to examine the characteristics of users’ information sharing in this community. We also counted the number of main threads getting the first response within 1-2 days, 3-7 days, 8-14 days, 2 weeks-half a year, and above half a year. The results are shown in Table 3.

‘Asking threads’ are aimed at obtaining useful information from the community. If the main post receives no responses, the poster will not be able to acquire the information needed. This study only analyzed the threads with responses from other users and examined the time length before they received the first response. Table 3 shows that in ‘asking questions’ threads, only 34.4% of the main postings got their first response within 1-2 days; 65.3% of them got their first response within 1-14 days. Additionally, 15.9% of them got the first response after half a year. For all threads, Table 3 shows that 30.5% of the main posts received their first response within 1-2 days, and 24.5% of them after half a year. The results indicate that most postings in this community did not get real-time responses within 1-2 days. A delayed response seems to be the norm.

Users typically actively share information and knowledge related to certain questions posted in the community. As Table 3 shows, 65.6% of sharing threads received the first response after half a year. This is quite different from asking threads, possibly due to their different nature. Some main postings even received the first response after 10 years, but could still draw users’ attention. This, to some extent, reflects that some professional experience of IT professionals is valuable regardless of time.

Solution of ‘asking threads’

Because most of the threads in this study are ‘asking threads’, we specifically analyzed the percentage of solutions in ‘asking threads’ and participation of discussion in them.
We categorized the threads into ‘solved’, ‘unsolved’, and ‘unknown’ as explained in Table 4.

According to the criteria, we calculated the threads with regard to whether the questions were solved or resources asked were satisfied. The results are shown in Table 5.

Table 5 indicates that 54% of ‘asking questions’ threads could be solved, while around 33% could not, and 20% was characterized as ‘unknown.’ We further examined the ‘unknown’ threads. A salient characteristic of these threads is that the initial posters did not actively interact with the responders, which hinders further discussion on the questions.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solved</td>
<td>Responses are related to the questions proposed by main postings or answer the initial posters' questions; or the posters of thread say “Thanks, it is solved”</td>
</tr>
<tr>
<td>Unsolved</td>
<td>The posters say “It is not solved”; the responses are not related to the postings or they do not answer the initial posters’ questions</td>
</tr>
<tr>
<td>Unknown</td>
<td>No feedback from the initial posters of the threads, though the main postings got response</td>
</tr>
</tbody>
</table>

Table 4. Criteria to categorized ‘solved’, ‘unsolved’, and ‘don't know' threads.

<table>
<thead>
<tr>
<th></th>
<th>Solved</th>
<th>Unsolved</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>88/54%</td>
<td>54/33.1%</td>
<td>21/12.9%</td>
<td>163/100%</td>
</tr>
<tr>
<td>AFR</td>
<td>3/60%</td>
<td>2/40.0%</td>
<td>0</td>
<td>5/100%</td>
</tr>
<tr>
<td>Total</td>
<td>91/54.2%</td>
<td>56/33.3%</td>
<td>21/12.5%</td>
<td>168/100%</td>
</tr>
</tbody>
</table>

Table 5. Distribution of asking threads in terms of solved, unsolved, and unknown.

Participation of discussion on ‘asking threads’

We calculated the numbers of participants who took part in the discussion of ‘asking threads’ by categorizing the discussion group into 1-3 participants (N=114), 4-6 participants (N=44), and above 6 participants (N=5). The results are shown in Figure 2.

In this community, users were unwilling to participate in the discussion on the questions. Almost 70% of the ‘asking questions’ threads could only attract 1-3 users to participate in the discussion. However, these participants are critical with respect to keeping the threads alive and eventually solving the problems.

Sharing information

Users share information with others in the community via posting, uploading attachments, or providing links. Based on the analysis of the threads, we found that for sharing information, users shared self-created postings, posted postings are usually the users’ personal experience, knowledge, and records. They posted such information to the community and shared it with others. The second way was to share information from other sources that users had previously saved. Attachments were a common way to share information. The third one usually included web links, by which the users shared sources with others who needed related information. The distribution of various sharing threads is shown in Figure 3.

<table>
<thead>
<tr>
<th></th>
<th>Self-created</th>
<th>Personal saving</th>
<th>Web links</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>59.40%</td>
<td>15.60%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Figure 2. Distribution of participants in terms of discussion groups.

Figure 3. Distribution of ways to sharing information.

As Figure 3 shows, among 32 sharing threads, almost 60% of sharing threads were self-created threads, 16% were personal saving threads, and 25% were web links. This indicates that this community is indeed a popular platform for IT professionals to share their personal experience in learning and working. In addition, users are willing to share their personal experience, which makes this community sustainable.

DISCUSSION

Based on content characteristics and users’ behavior patterns in the virtual community examined, the study identified four types of information seeking and sharing...
activities: resource sharing, experience sharing, asking questions, and asking for resources. Our results indicate that most of threads could be characterized into asking questions, while sharing threads were browsed more frequently than asking threads. This is a salient feature of this VC. In particular, experience sharing threads were browsed more frequently when compared to other threads. Most of the ‘asking questions’ threads receive the first response within 1-14 days, but some could still receive responses after half a year. The results suggest that as a IT professional virtual community, ChinaUnix.net is a popular VC for information seeking and knowledge contribution. It provides a platform for the members to exchange information to improve their work and study in the IT area. The following section further discusses users’ typical information behavior and the sustainability of professional VCs.

Typical behavior when seeking and sharing information in virtual communities

How do users engage in information seeking and sharing in virtual communities? In this study, we found that users obtain useful information via asking, responding, interacting, browsing, uploading, posting, and linking (i.e. providing web links to others).

‘Asking’ generally prompts a process of information seeking. In particular, as the one in this study, most of threads were asking threads, either asking questions or asking for resources. On one hand, this indicates that the virtual community is a platform for IT professionals to exchange learning resources and professional knowledge. On the other hand, it suggests that ‘asking’ is an important manifestation of information behavior in such VCs. It lights up an interactive process, and then responding behavior follows. ‘Interaction’ between users in a VC is an important vehicle to guarantee discussion on a question that eventually leads it to be solved. As this study indicated, some unsolved or unknown questions could be attributed to the lack of interaction between posters. Therefore, it is imperative to motivate interaction between posters to get questions answered. This is consistent with Wise et al. (2006), who found that message interactivity affects people’s intent to participate in VCs. ‘Responding’ is an outcome of interaction. In this study, users’ responses to others’ asking and sharing activities include files, web links, or their self-created content. They respond to the postings by uploading useful resources, posting related answers, and providing useful web links that help the questions be solved. The study indicates that ‘asking’, ‘interacting’, ‘responding’, ‘uploading’, ‘posting’, and ‘linking’ are composed of an information exchange chain in the VC. ‘Asking’, ‘interacting’, and ‘responding’ are kernel activities during the process of information seeking and sharing in the community.

We found that in this study the users seek information mostly via browsing. As Savolainen (2001) showed, this study also found that the users in the VC preferred to share their own experience as a type of information source. Moreover, shared personal experience was quite popular in this community and was browsed more frequently than other information. This suggests that the members’ experience in the IT area is greatly valuable for the users and is viewed as an important information source. On the other hand, it also informs that browsing is a major strategy to gather useful information in this community.

Sustainability of virtual communities

People have realized that VCs are good platforms for users to seek, contribute, and share information and knowledge. However, the failure of VCs has motivated researchers to explore what factors contribute to the sustainability of a VC. Earlier studies indicate that contextual factors, technical factors, individual factors, and so forth, play an important role in keeping users continued intention to participate in a VC (Chen, 2007; Chen & Huang, 2010; Wise et al., 2006; Phang et al., 2009). The VC examined in this study has a long history in the IT area in China. Our results suggest that there are several critical factors that keep effective and continuous interaction among users. First, though most users only browse the threads, a small group of core participants who play an important role in solving other users’ problems. In this study, more than half of the asking question threads were answered and discussed by a small group of no more than 3 participants. However, they actively answer other users’ questions and keep the discussion moving forward. Such effective interaction between respondents and posters make the continuous discussion possible. This also indicates that most of the members in this VC are aimed at receiving information rather than giving it. Second, experience sharing threads are the most popular in this community. Users are mostly interested in others’ experiences by browsing these threads. This indicates that experience, either from learning or working, is important to the users in this VC. They use this as a platform to share their experiences and help other users. Third, high quality threads are important for a sustainable VC. In this study, some historical threads were rumbled and still received responses. This suggests that users always expect good content in a VC, regardless of the time it was posted.

Implications and Limitations

This study should help people understand how VC users seek and share information in a virtual environment. Asking and sharing are the most important activities they perform. Therefore, it is quite important for a VC to provide a good mechanism to support asking and sharing activities. Moreover, in order to keep a sustainable VC, it is critical to cultivate and attract a group of core participants. Browsing is an important approach for the users to obtain useful information. Thus, it is also imperative for a VC to provide a good mechanism to support browsing. For users who ask questions, this study suggests that keeping interaction with other users is important to solve problems and to receive answers. Indeed, it is effective and welcomed to share personal experience from study or work
in a VC. Encouraging users to share their own personal experiences is critical for keeping a sustainable VC.

This study also has some limitations. First, the sample is rather small. We only extracted 200 threads posted within two week period. In particular, since the number of sharing threads is low, the study did not specifically examine them. Therefore, we could not draw a holistic picture of information seeking and sharing behavior in a VC. Second, this study only examined one IT VC in China, although it is a popular one. Some results may not be generalizable. Third, the study is basically a descriptive one. It could reveal some characteristics of users’ information seeking and sharing behavior, but could not explain why that happens. Also, the study reveals that sharing threads may imply more interesting story and deserve a deeper examination. Future studies should further examine these issues.

CONCLUSIONS AND FUTURE STUDIES

This study identified four activities that users seek and share information in a VC based on an analysis of 200 threads extracted from a VC for IT professionals in China: asking questions, asking for resources, resource sharing, and experience sharing. Our study examined the characteristics of users’ sharing and asking behavior by performing descriptive statistics. ‘Asking’ is the major activity in this VC by which users seek information from other participants. Half of the questions could be answered within 14 days. However, most of sharing thread get a delayed response (over half year). This suggests that to IT professionals, some of their professional experience could be valuable in a long term. Though most of the threads were for asking questions, the users in this community browsed sharing threads, especially experience sharing threads the most. This indicates that experience sharing threads are the most popular and draw the most attention when compared to other threads. That may be because the members of this community are isolated and it is hard for them to communicate face to face. Responding to such context, they keep knowledge and information exchange effectively by browsing sharing threads. Over half of ‘asking question’ threads could be resolved successfully; most of the ‘asking question’ threads could only attract a small group of participants for discussion. IT professionals pay more attentions to get information or knowledge rather than to actively contribute their knowledge. However, this small group of participants played a critical role in keeping the community sustainable. The study also revealed typical information seeking and sharing behaviors that support users’ engagement in VC, such as asking, interacting, responding, uploading, posting, linking, and browsing. All these activities help to keep the VC active and sustainable.

Future studies with more VCs and more posting extractions will be necessary to further examine information seeking and sharing behavior in VCs. Semi-structured interviews and comparative studies could be conducted to examine sustainability of VCs. It is also necessary to further explore information seeking and sharing behavior and activities, and develop a theoretical framework to inform future empirical studies.

ACKNOWLEDGEMENT

The authors would like to thank the reviewers’ hard working and insightful comments to make the paper better.

REFERENCE


