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Investigation of the Effects of Members' Closeness, Size and IT in Virtual Communities: The Social Network Perspective

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ABSTRACT

There has been insufficient attention on how relationships among members are essential for building of loyalty towards a community and on the effect of size on this relational aspect of VC although being acknowledged as critical factors in Virtual Community (VC) research. The informational and social impact of information technology (IT) usage in a VC is also unclear.

Taking the perspectives of Social Network and Social Capital Theory, this paper investigated how size, IT, strength of relationship, members' commitment and members' intention to stay interplay in a VC. A cross sectional survey across various social VCs was conducted and the implications for practitioners as well as academics are also presented.

Keywords

Virtual Community, Size, Information Technology, Intention to Stay, Social Network, Social Capital Theory

INTRODUCTION

VCs have been found to be a highly supportive and positive experience for their members (Rheingold, 1993), and companies have been paying great attention to nurture them to increase customers' loyalty to the website of the firm (Aschomoneit & Heitmann, 2003). In early 1999, for example, a woman who provided information about dolls disappeared from a doll community in eBay. Those in the community who had come to know and value this woman became worried. When they tracked her down, they learnt that she had a divorce; her husband had the computer and she did not have the money to buy a new one. Some members in the community pooled together a sum of money to purchase a computer for her because they missed her and wanted her back online (Bradley, 2001). This group of members is likely to visit eBay more frequently than others.

As evident in the above example and past studies, strong relationships among members are essential to increasing members' commitment and loyalty in a community (Hagel & Armstrong, 1997). Size of the community is also believed to play a critical role in building strong relationships among members either offline or online (Hagel & Armstrong, 1997; Figallo, 1998). In the context of VCs as opposed to offline communities, the use of an information technology (IT) infrastructure further characterizes the community. However, there is as yet little empirical investigation to confirm the effects of relationship on members' loyalty in the context of a VC. The effect of community size on the relational aspect of a VC remains unclear. Furthermore, to the best of our knowledge, there has been no study investigating both the social impact and practical impact of IT usage in a VC. To address the limitations and gap in existing studies, this paper seeks to address the following research questions from a social network approach, using the Social Capital Theory as theoretical basis:

- What is the effect of IT usage for communication among members on strength of relationships among members in a VC?
- What are the effects of size on strength of relationships among members in a VC?
- Do strong relationships among members lead to their commitment and intention to stay in a VC?

LITERATURE REVIEW AND THEORETICAL DEVELOPMENT

“Social Capital” was initially introduced in community studies to highlight the importance of networks of strong personal relationships that provide the basis for collective action in communities (Jacobs, 1965). A social network is defined as a “specific set of linkages among a defined set of persons” (Mitchell, 1969). As the source of social capital lies in the structure and content of the actors’ social relations (Adler & Kwon, 2002), social network is therefore the source which embodies social capital. We adopt in our study the Social Capital Theory because of its emphasis on social relations, and we take the social network approach because it views community as a system of objects (e.g., people, groups) joined by a variety of relationships.

Relationship Development in VC

Relationship development is one of the four needs driving the formation of a VC; the other three needs are information, transaction and fantasy (Hagel & Armstrong, 1997). As suggested by Rheingold (1993), relationship development occurs when members participate and interact with one another long enough with sufficient human feelings. However, though participation may lead to relationship development, it does not guarantee the formation of one, not to mention a strong one (Figallo, 1998). Moreover, the level of participation among members in a VC may vary with size as the community grows and social loafing takes place (Butler, 2001). Despite so, previous studies have used participation or interaction as a surrogate measure of either relationship or sustainability of a VC.

It has been argued that relationships among members help solidify commitment and loyalty to the community (Figallo, 1998). For that, we are of the view that strength of relationship is a more important aspect of a VC compared to participation as it attests the commitment and loyalty of members, which are key contributors to a VC’s sustainability (Figallo, 1998). However, there is as yet no empirical study conducted to confirm the importance of strength of relationship in increasing members’ commitment and loyalty towards a VC.

Effects of Size

As Lin (2001) and Adler and Kwon (2002) noted that social capital should be conceived in a social context and as resources accessible through social ties, the accumulation of social capital is constrained by factors such as strength of ties; community commitment; time, which is needed for maintenance of ties (Granovetter, 1973); and social distance, which would cause the likelihood of reciprocity of social capital to decrease (Harary et. al, 1965). Because of these constraints, there exists a limit to the number of ties formed in a collectivity, henceforth, a maximum collectivity size. The existence of a threshold community size is evident in a few past studies in the offline context where it is generalized to be three to 12 (Hare, 1979).

Size poses a challenge and threat to interaction opportunities in both offline and online communities (Figallo, 1998). Since relationships are developed through quality interactions among members, a key factor affecting relationship among members is community size. Most studies in the offline context have highlighted the negative effects of growth in size on interpersonal communications and relationships in the community (e.g. Astley, 1985; Alexander et al., 1996).

In the virtual context, the findings are controversial, with some arguing size as a contributor of attractiveness (Markus, 1987; Hagel & Armstrong, 1997), retention of members and sustainability of a VC (Butler, 2001); and others arguing it as the contributor to presence of “lurkers”, and the decline in participation level in a VC (Rothaemel & Sugiyama, 2000). In the case study conducted by Rothaemel et al. (2000) on TimeZone, members of the community reported formation of cliques and unfriendliness of groups towards new members as the community increased in size.

Usage of Information Technology

IT infrastructure in a VC, however has been found to enable a VC to transcend time and space (Wellman & Gulia, 1999), hence affecting the use of social capital. Various studies investigating the use of IT for communication exist. However, they reflect conflicting views, with some studies establishing IT-supported communication channels as being less rich (Draft et. al, 1987), having a lower social presence than the FTF medium, less personal, and hence best left for unemotional information exchanges; others challenged to establish the possibility of having personal relationships online (e.g. Parks & Floyd, 1996).

Despite the conflicting views on the use of IT in communication, no study has been done to reconcile the divergent perspectives. Studies so far have merely compared users’ emotional experiences with the IT-supported medium against those with the FTF medium. As in the VC context, both information sharing and emotional support are important purposes of members’ participation (Chan et al., 2004; Hagel & Armstrong, 1997), the results of such studies would not be applicable to the VC context. It is therefore more crucial to investigate the capability of IT in supporting both emotional and informational exchanges in the VC context.

Public Resources

In a VC context, resources leveraged via ties would likely be transmitted through its IT infrastructure, whereby information is posted publicly on the forum board. As a result, some of the social capital residing only on ties may become public resources, belonging to the VC (Lin 2001). Although our study focuses on the impact of size and IT usage on members' relationships in a VC, it is essential to include public resources in our research because one of the four needs driving the formation of a VC is information, and this is what members try to leverage through social capital with strong ties in their social network.

Finally, though past studies have alerted organizers to the need to manage the issues of social loafing by controlling the size of a VC, the studies have not offered insights to organizers on other managerial aspects, especially in terms of managing relationships among members along with size of the community. Therefore, an investigation into the effects of size and the role of IT in relation to strength of relationships, and information sharing in a VC is truly necessary.

RESEARCH MODEL AND HYPOTHESES

Adopting a social network perspective, and using the Social Capital Theory as basis, we propose our research model to investigate the effects of size, IT and strength of relationships on a VC (Figure 1).

Following Rheingold (1993), we define VC as a social aggregation that emerges from the Internet when enough people carry on public discussions long enough, with sufficient human feelings, to form webs of personal relationships in cyberspace. We adopt this definition in our study because of its emphasis on the personal relationship aspect in a VC.

A VC is commonly classified according to the orientation it takes in catering for its target members, its content type (i.e., information, entertainment or transaction) (Aschmoneit & Hietmann, 2003), and its uses and goals (Hummel & Lechner, 2002). In this paper, we focus on the social VC and equate it with a non-work related VC which emphasizes social interactions, relationship building and the leisure needs of people (e.g., games or special interests community). We distinguish a social VC from a work-related VC, characterizing the latter with having a specific task or goal to achieve. The non-work related is chosen over the work related VC because hierarchy usually exists in the latter, which may affect the strength of relationships among members, possibly posing the problem of confounding effect for our study. Furthermore, as a work related community is more goal-oriented, its members would be very task focused, thereby placing less emphasis on social interactivity among them as compared to those in a non-work related community (Alavi & Leidner, 2001).

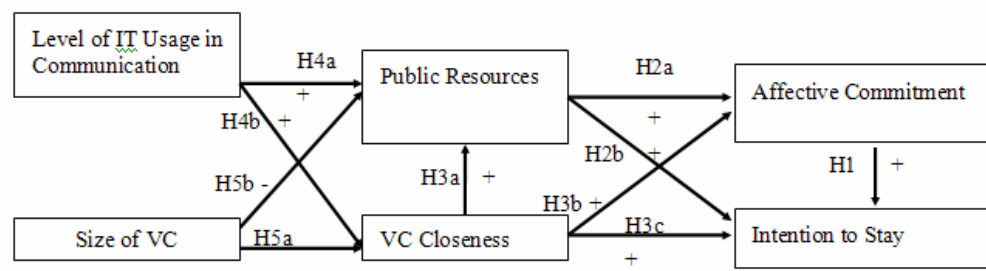


Figure 1. Research Model and Hypotheses

Affective Commitment and Intention to Stay

Affective commitment is built on the “affective or emotional attachment” to a community such that the strongly committed individual “identifies with, and is involved” in the community. Loyalty is a key contributor to VC sustainability (Figallo, 1998). In the organization loyalty literature, a typical action component indicator of an employee’s loyalty is remaining with and not leaving a company (Powers, 2000). Therefore, we consider intention to stay an outcome of loyalty. When a person feels committed to a community, he or she will be more involved, values membership, and therefore is likely to remain in it (Mowday et al., 1979). Hence, we posit:

- Hypothesis 1: The higher a member’s level of affective commitment, the higher will be the member’s intention to stay in the VC.

Public Resources

Public resources are defined as resources that are publicly available to all members in a VC and can be referred to as material or information exchanged (Wellman & Gulia, 1999) and shared among members in the VC. In fact, the concept of public resources is similar to the concept of usefulness in the Technology Acceptance Model (TAM) (Davis et. al, 1989). According to TAM, usefulness increases attitude towards use. Since affective commitment is a form of attitude, we posit:

- Hypothesis 2a: The more available public resources in a VC, the higher will be a member's level of affective commitment.

According to the cost-benefit paradigm in the Behavioral Decision Theory on which TAM is based, an individual chooses among alternatives in terms of the cognitive tradeoffs between the effort required and the benefits of the resulting decision (Beach & Mitchell, 1978). Since members of a VC place great importance on the collective information generated (Chan et al., 2004), when there is a high level of public resources in a VC, it becomes more costly to leave due to uncertainty about the level of public resources in other VCs. Hence, we hypothesize:

- Hypothesis 2b: The more available public resources in a VC, the higher will be a member's intention to stay in the VC.

VC Closeness

Masden and Campbell (1984) established the concept of "closeness" as being the best indicator of tie strength. For our research, we define closeness as being equivalent to emotional intensity in a relationship and consider a relationship as close when it embodies high emotional content (Berscheid et. al, 1989). This concept is adopted instead of the direct concept of "strength of tie" because there is no one instrument measuring tie strength due to little sustained attention to the measurement of the strength of tie concept (Masden & Campbell, 1984).

The Social Capital Theory states that the stronger the ties among members, the more likely the sharing and exchanges of resources. Furthermore, based on the strength of tie concept from the social network perspective, whatever is to be diffused can reach a larger number of people when all small groups are closely tied to an integrative whole (Granovetter, 1973). Therefore, we hypothesize:

- Hypothesis 3a: The closer relationships in a VC, the more available public resources will be in the VC.

As development of social relationships is another interest (besides acquisition of public resources) when individuals join a VC (Zhang & Hiltz, 2003) members may therefore find it more emotionally beneficial staying in a VC with strong ties among members. Based on TAM (Davis et al., 1989) and the cost-benefit paradigm from the Behavioral Decision Theory (Beach & Mitchell, 1978), we postulate:

- Hypothesis 3b: The closer relationships in a VC, the higher will be a member's level of affective commitment.
- Hypothesis 3c: The closer relationships in a VC, the higher will be a member's intention to stay in the VC.

Level of Information Technology Usage

In a VC, IT is used and characterized as a potentially efficient means of communication which has a greater geographical reach. Temporal and spatial limitations are therefore overcome in a VC, and members can have more frequent and simultaneous exchanges of information over a wider geographical scope than in an offline community, thereby strengthening ties among them (Wellman & Gulia, 1999). Hence, we hypothesize:

- Hypothesis 4a: The higher level of IT usage for communication among members, the more available will be the public resources in a VC.
- Hypothesis 4b: The higher level IT usage for communication among members, the closer will be the relationships in a VC.

Size of VC

Studies have found relationships among members in an offline community being eroded as size increases (e.g., Astley, 1985; Shaw, 1979). Thus, we hypothesize:

- Hypothesis 5a: The larger the size of a VC, the lesser will be relationship closeness in the VC.

As for the impact of size on resources, Butler's (2001) Resource-based model states that size is indicative of the amount of resources. However, his research too found that as a collectivity grows beyond its critical mass, there might eventually be occurrence of social loafing, leading to unavailability of resources. Furthermore, as social distances among members increase with size, there may be a decrease in strength of relationships and an eventual reduction in the level of public resources (H3a). In addition, according to the structural theory in social network research, there exists a critical social distance, beyond

which communication becomes difficult, thereby decreasing the likelihood of reciprocity and sharing of resources (Harary et al., 1965). Hence, to verify this notion, we posit:

- Hypothesis 5b: The larger the size of a VC, the less available will be public resources in the VC.

RESEARCH METHODOLOGY AND DATA FINDINGS

To test our proposed research model, we adopt cross-sectional survey as few social network studies adopted this as the main data collection method.

Measurement and Data Collection

We drew up a web-based questionnaire with items adapted from existing measures validated by other researchers. To measure Level of IT Usage for Communication, we modified items from Massenti and Zmud (1996). The items for Public Resources were adapted from Moorman (1995), and Greisdorf and Spink (2000), which asked for perceptions of availability and relevance of resources. Items for VC Closeness were obtained from a measure developed by Barnes (1997), which reflects the emotional tone of the relationship. The instrument for measuring level of Affective Commitment was adapted from the Affective Commitment scale (Allen & Meyer 1990) and Organizational Commitment Questionnaire (Mowday et al. 1979). The items for Intention to Stay were adapted from items measuring Behavioral Intention in the Theory of Reasoned Action (Azjen & Fishbein 1980). The total member population in the VC represented Size of the VC.

The sample population for this study comprised members of non-work related VCs of a range of sizes and interests, in the form of online forums. 164 valid responses were collected from 15 VCs. Among the 164 respondents, 76.2% were male and 23.8% were female. Slightly more than half the number of respondents was aged between 20 and 29 years old.

Validity of Instrument

To validate our measurement model, we used two types of validity measures, namely content validity and construct validity.

We established content validity of our instrument by adapting items from past literature which had been tested and used to measure similar constructs. We further strengthened content validity with a pilot study conducted on 35 undergraduates and graduates of a university. Table 1 shows the convergent validity of our instrument, and evidence of high discriminant validity. Internal consistency reliability is assessed by calculating Cronbach's Alpha values, and composite reliability, with 0.7 as an acceptable value for each.

No.	Construct	No. of Items	Cronbach's Alpha	Composite Reliability	AVE	Correlations					
						1	2	3	4	5	6
1	Size	1	-	-	-	1.000					
2	Information Technology	4	0.917	0.942	0.803	0.052	0.896				
3	Closeness	5	0.920	0.942	0.764	-0.058	0.552	0.874			
4	Public Resources	5	0.890	0.937	0.748	0.129	0.538	0.495	0.930		
5	Affective Commitment	3	0.722	0.847	0.653	-0.076	0.509	0.612	0.519	0.808	
6	Intention to Stay	3	0.920	0.949	0.862	-0.099	0.513	0.472	0.519	0.482	0.928

Table 1. Descriptives and Correlations

* The shaded numbers in the diagonal row are square roots of the average variance extracted.

Structural Model

With adequate measurement models, we tested our proposed hypotheses using PLS Graph (3.00). The results of the analysis are summarized in Figure 2 (along with the path coefficients and significant levels).

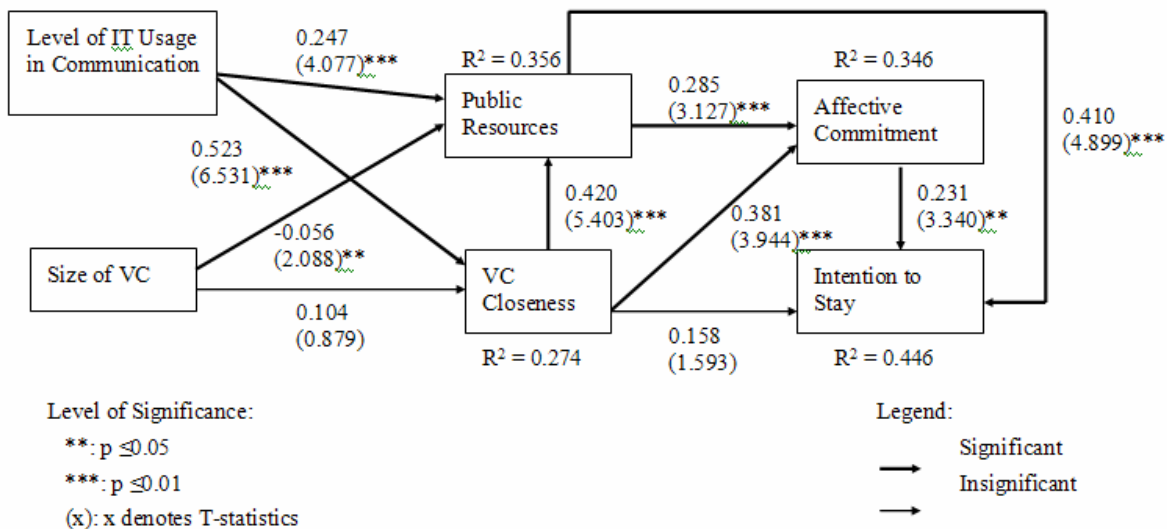


Figure 2. Results of PLS Analysis

Based on the results from the PLS analysis, all, except the relationship between closeness and intention to stay (H3c), and the relationship between size and closeness (H5a) are supported.

DISCUSSION AND IMPLICATIONS

The objective of this study is to enhance understanding about the influence of IT and the effects of community size on increasing strength of ties among members, and eventually, their commitment and intention to stay in the social VC through the social network perspective, and the Social Capital Theory.

A significant relationship between members' affective commitment and intention to stay in a VC implies that though contractual binding (a feature of work-related VCs) is absent in non-work related VCs, the feeling of affective commitment itself is sufficient to retain members. Furthermore, in alignment with TAM (Davis et al., 1989) public resources exert a significant effect on affective commitment and intention to stay in a VC, which is similar to the marketing relationship, where a consumer is likely to remain in the relationship if the benefits received are not easily replaceable by other potential partners (Bendapudi & Berry, 1997). Administrators should thus pay more attention to the cultivation of members' emotional attachment to the VC and try to raise switching cost by providing more useful and unique content at their websites.

In line with the Social Capital theory, our findings have shown strong relationships leading to a high level of public resources generated as well as members' affective commitment. We could therefore conclude that the Social Capital Theory, an offline community theory, can be applied to the online context as well.

Our findings have reconciled the divergent views on the capability of IT for communication in the VC context by establishing the possible co-existence of high level of informational exchanges as well as strong ties by leveraging heavily the IT tools available for communication. Administrators of VCs should improve the media richness and social presence of the existing IT infrastructure by providing add-ons in the form of video conferencing and chatting functions, where everyone gets the chance to chat and meet one another without having to schedule offline meetings.

We have also found that size indeed affects the level of resources available in a VC negatively rather than positively. This could be due to three reasons: 1) social loafing by members (Bulter 2001), 2) the possible distortion and cost of communications with increasing social distance (Harary et al. 1965), causing communication to become difficult and thereby decreasing the likelihood of reciprocity and sharing of resources or, 3) the public goods dilemma (Barry and Hardin 1982). In the public goods dilemma, resources contributed for the good of a VC can be used by others regardless of whether or not they make a contribution in return (Dawes 1980). This causes a decrease in the level of reciprocity and sharing of resources. From

these findings, VC administrators may wish to 1) manage the size of the VC by grouping active members together into a private discussion “room”, restricting inactive members’ access into it, 2) show recognition through rewards, 3) implement penalty such as disallowing inactive members from enquiring information in the VC, to increase reciprocity or sharing norms of members, and to reduce social loafing. However, the significant negative relationship between size and public resources should be interpreted with caution as, although it is those active members who contributed to resources in a VC, we had to rely on the total number of registered members due to difficulty in data collection. Furthermore, not knowing the reason underlying the negative relationship between size and public resources is another limitation. Future research could therefore try to extend our study into this area by conducting interviews with members of a VC.

Interestingly, we have found, firstly an insignificant relationship between VC closeness and intention to stay. This finding is further indication that the building of relationships among members in a VC although important, is not sufficient to make members stay if there is not enough benefits. Secondly, relationship between size and strength of relationship is insignificant yet positive. This finding contradicts previous offline studies which consistently cited the negative effects of size on relationships. Based on the observations during our data gathering, most respondents to our survey were active members who logged onto their VC more than once a day and they tend to only communicate with the other active members. Hence, when answering the questionnaire, they might have done it based on their experiences with the other active members, rather than that with the entire VC. This could have resulted in responses skewed towards the positive side. On the other hand, the finding could be an indicator that size of VC is not important to the members as long as strong relationships exist with enough members and needed information is present. The strong effects of IT (H4a and H4b) in a VC could also have contributed by bridging social distances and reducing members’ consciousness about the size of the VC, and hence the negative effects of size.

CONCLUSION

This study has contributed to the existing VC literature in terms of its adoption of a new perspective – a social network perspective to VC research. As most of the hypotheses formulated based on this new perspective are supported, we could conclude the suitability of an offline community perspective in the VC context. In addition, our paper has established the ability of IT to enhance both informational and emotional support simultaneously in a VC, reconciling conflicting prior findings on its usage. Lastly, our study has helped filled the gap with regards to the dearth of studies on effects of size, and relationship development aspect of a VC. Unlike previous studies that used participation as a surrogate measure of relationship and sustainability of a VC, we have emphasized strength of relationship and its effects on the two contributing factors to a VC’s sustainability: 1) members’ level of commitment, and 2) their intention to stay. Based on our findings, relationship, though insufficient, is essential in its contribution to a VC’s sustainability.

In this research, we have established the importance of size, IT and relationship towards VC’s viability. Our findings suggest that if VC owners want to improve members’ loyalty to their VC, they should pay attention to nurturing member-to-member relationships. VCs owners should also constantly provide useful information to members, and continue to scrutinize the growth of their VCs in terms of size, coming up with ideas to manage it so as to avoid social loafing or communication difficulties among members.

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