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Sense of virtual community and knowledge contribution in a P3 virtual community

Motivation and experience

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Abstract

Purpose – The aim of this paper is to employ the perspectives of uses and gratification theory and experiential marketing to investigate the antecedents of virtual community (VC) members' attitude formation and knowledge-contribution intention through the sense of virtual community (SOVC) and the interaction between their motivations and experiences in a peer-to-peer problem solving (P3) VC.
Design/methodology/approach – This study chose a well-known professional IT VC in Taiwan, the ITHelp community, as the target for data collection. An online survey linked from the homepage of this community was used through the cooperation of the vendor of this community. This study employs the partial least squares (PLS) method to examine the research model.
Findings – The results show that members' attitudes toward their VCs are determined by the interaction between their motivations for and experiences with P3 VC usages. Moreover, SOVC plays full mediating roles in the relationship between attitude toward P3 VC and knowledge-contribution intention.
Research limitations/implications – VC managers need to aim at creating pleasant experiences for their members and foster their belongingness and consciousness to form higher SOVC. The conclusions are restricted to a VC that involves IT-related issues, which focuses problem solving rather than being socially oriented. Members of IT P3 VCs are usually highly innovative and enthusiastic about new IT products, which is quite different from the membership of other P3 VCs.
Originality/value – Extant studies seldom considered the effects of SOVC and members' experiences on knowledge-contribution behavior. The mediating role of SOVC and the interaction between motivations and experience can enhance our understanding about online knowledge-contribution behavior.

Keywords Virtual communities, Uses and gratification theory, Experiential marketing, Sense of virtual community, Knowledge contribution, Marketing, Information technology, Taiwan
Paper type Research paper

1. Introduction

More recently, the peer-to-peer problem solving (P3) virtual community (VC) in Taiwan has become one of the most important VC type, many people prefer to use P3 VC for solutions seeking and knowledge sharing. Thus, how to lure more community members to contribute more valuable knowledge, has become an important online

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business issue. With the development of Web 2.0, the internet is no longer only a tool for information search; it has become an important part of our lives. VC, a new and ubiquitous medium of online social groups, has been given much attention by researchers and managers and grown rapidly during the last several years (e.g. Koh and Kim, 2003; Lu *et al.*, 2010). Rheingold (1993) describes VCs as computer-mediated social groups in which various users can freely communicate and exchange information with each other. VCs are networks in which online users share common interests and interact together voluntarily and socially for information and resource exchange (Gu *et al.*, 2007; Rheingold, 2000; Romm *et al.*, 1997; Sanchez-Franco and Rondan-Cataluña, 2010). People have different interests and motivation; thus, various types of VCs, such as social, tourist, information technology, gaming, and professional networks, have emerged recently.

These VCs emphasize collaboration and sharing among users, and they provide unprecedented opportunities for users to share their opinions, insights, experiences, and perspectives with each other interactively and collaboratively through many different forms, including text, photos, audio, and video (Dearstyne, 2007). Ku (2011) also argued that a VC also places a high value on knowing the participants to achieve the best possible solutions for their participants. It enables businesses to become engaged with and have insight into the customers' request and their special experience.

One of the most significant benefits offered by VCs is a rich amount of knowledge to satisfy curiosity or solve problems, such as P3 VC mentioned in Mathwick *et al.*'s (2008) study. Ku and Fan (2009) pointed out that knowledge sharing is an important means to create value. In order to enhance the competitiveness of VCs, VC managers are attempting to encourage their users to contribute knowledge in order to provide value to other members and ensure sustainable development. Mathwick *et al.* (2008) consider that knowledge exchange can be regarded as the core of a virtual problem-solving community. Although knowledge exchange may be important to communities, it is not a goal of all communities. In some cases, emotional support or entertainment may be more important than sharing know how or know what. However, we are interested in knowledge-exchange issues, such as knowledge-contribution intention, rather than communication in general within VCs. We thus seek to investigate the knowledge sharing issue in the P3 VC context. Most P3 VCs fail mainly due to the reluctance of users to share knowledge within them. This has led to the investigation of knowledge sharing in VCs by some researchers in an effort to determine what factors are significant to knowledge-sharing and knowledge-management success (e.g. Chiu *et al.*, 2006; Fang and Chiu, 2010; Hsu *et al.*, 2007; Koh and Kim, 2004; Lin *et al.*, 2009; Wasko and Faraj, 2005; Yu *et al.*, 2010). In order to make VCs sustainable and maintain a sufficient number of members, Blanchard (2007) argues that community managers need to generate a certain degree of members' sense of virtual community (SOVC) to make members feel that they belong to a unique group; such meaningful relationships retain existing community members and further attract potential newcomers. Keng *et al.* (2011) also consider the consumer in the process of post-purchase, reinforcing the SOVC for consumers can reduce post-purchase dissonance and enhance the loyalty. SOVC refers to the feelings of attachment and belonging that members have for their VC. Higher SOVC will nurture and strengthen the relationships between a VC and its members (Blanchard, 2007). To our knowledge, the relationship between SOVC and knowledge contribution has not been investigated sufficiently. This study intends to examine the effects of SOVC on P3 VC members' knowledge-contribution intention through empirical data collection.

With the growth of online participation in social networking sites, members have become the kernel and the driving force behind VCs. The success of a P3 VC depends on its members' responses, which involve why they use the P3 VC and what they perceive through usage of the P3 VC. In order to improve the attractiveness of a P3 VC to its existing and potential customers, the customer experience of using the P3 VC should be addressed. Recently, several marketers have changed their strategy from merely selling products or services to selling consumers an experience. This aspect of consumer economy, which has significant effects on customers' attitudes toward sellers, has been given much attention by several researchers (e.g. Grewal *et al.*, 2009; Pine and Gilmore, 1999; Schmitt, 1999). Although customer experience can be regarded as playing an important independent role in explaining customers' attitude formation, this study instead intends to investigate the antecedents of P3 VC members' attitude formation through the interaction between their motivations and experience. Based on Baron and Kenny's (1986) arguments, a moderating variable, which is also a kind of independent variable, plays a more important role than a pure independent variable in explaining the dependent variable. Moreover, Baron and Kenny (1986) argue that moderating variables can be introduced when the relationship between independent variable and dependent variable is weak or inconsistent. In this study, the motivational factors do not necessarily lead to attitude formation. The motivational factors and customer experiences can be regarded as expectations prior to (why users use) and perceptions after (what users perceive) P3 VC usage, respectively. This study employs the uses and gratification (U&G) theory proposed by researchers from the communication field to explicate why members use a community as an efficient means to fulfill their various needs. When an individual's experiences are congruent with his/her prior expectations, a favorable attitude toward a certain P3 VC will be developed.

With the above motives, this study intends to investigate the roles of customer experience and motivation in forming attitude toward P3 VCs as well as the effects of attitude and SOVC on knowledge contribution. This study employs a survey in an online information technology forum to test the research model.

2. Theoretical background and hypotheses

2.1 SOVC and knowledge contribution

Preece (2001) considers VCs that act as virtual social spaces in which people can share information, find support, learn, or interact with each other by bringing together individuals working on similar problems. Due to the ubiquity of the internet, VCs have become a major online method of knowledge sharing (Armstrong and Hagel, 1996). That is, VCs are networks in which online users voluntarily and socially share common interests and interact with each other to exchange information and resources (Gu *et al.*, 2007). This study is interested in the P3 VC which falls within the domain of electronic "networks of practice" (Mathwick *et al.*, 2008), defined as "self-organizing, open activity systems focussed on a shared practice that exists primarily through computer-mediated communication" (Wasko and Faraj, 2005, p. 37). In other words, The P3 VCs are designed to facilitate knowledge sharing and learning, by bringing together members working on similar problems (Mathwick *et al.*, 2008). People cannot only provide their knowledge to solve other members' problems but also obtain knowledge that they need via P3 VCs. Knowledge reciprocity is a major determinant of people's participation in P3 VCs, and encouraging members to contribute their knowledge is thus important for the sustainability of P3 VCs. Making abundant and

useful knowledge available could be an efficient strategy to retain extant members and attract potential members. Shen and Chiou (2009) also argue that users' specific asset investment (e.g. learning, knowledge) on a blogging community will positively affect their intention to stay with the blogging community.

McMillan and Chavis (1986, p. 9) define sense of community as "a feeling that members have of belonging and being important to each other, and a shared faith that members' needs will be met by the commitment to be together." This definition is based on four elements: membership, influence, needs fulfillment, and emotional connection. Membership refers to the feelings of belonging and awareness of being part of an integrated whole. Belonging guarantees members real objective protection and subjective reassurance, and implies the definition of group borders, emotional security, identification, affective investment, and the sharing of a symbolic system (Prezza and Constantini, 1998). Influence indicates the reciprocal relationship of members and the community in terms of their ability to affect change in each other, so that it expresses both the power of the group and the power of the community compared to other communities. Needs fulfillment suggests that members of a community believe that the resources available in the community enable them to meet their needs through cooperative behavior within the community, thereby reinforcing their appropriate community behavior (Chipuer and Pretty, 1999). Emotional connection reflects the commitment and belief that members have shared and will share history, common places, time, and similar experiences together.

In order to develop a more appropriate measurement for the VC context, Koh and Kim (2003) propose the SOVC measurement, characterized by three dimensions: membership, influence, and immersion. Membership indicates that people experience feelings of belonging to their VC. Influence implies that people influence other members of their community. Immersion suggests that people feel the state of flow during VC navigation. These three dimensions of SOVC reflect the affective, cognitive, and behavioral aspects of VC members, as does the general construct of attitude in the area of marketing or behavioral science (Koh and Kim, 2003).

Chai and Kim (2012) pointed out that a stronger sense of belonging encourages online users' participation in knowledge-contribution behavior. Thus, when people think they belong to a certain community, they will think of themselves and other members of this community as a collective and make commitments of time and effort to do something good for this community. SOVC may foster members' identification with the community so they will be willing to share knowledge with others in the same community (Chiu *et al.*, 2006; Kollock, 1999; Nahapiet and Ghoshal, 1998). Mathwick *et al.* (2008) argue that knowledge sharing is the overt outcome of members' participation in an online social group when they show high commitment. Wasko and Faraj (2005) also find that people who have a strong sense of commitment to a social network are likely to share knowledge with others because they think this is the right thing to do. This study argues that a member with high SOVC will have strong commitment to the relationship with the P3 VC, which could motivate him/her to patronize the P3 VC again and share knowledge for the shared good. This study has the following hypotheses:

H1a. Membership dimension of SOVC has a positive effect on the knowledge-contribution intention.

H1b. Influence dimension of SOVC has a positive effect on the knowledge-contribution intention.

H1c. Immersion dimension of SOVC has a positive effect on the knowledge-contribution intention.

2.2 Attitude toward the P3 VC

Previous studies (e.g. Katz, 1998; Nonnecke and Preece, 2001) suggest that very few online users will actually post or share their opinions or knowledge. That is to say, most users are lurkers. Both contributors and lurkers may have favorable attitudes toward the web sites they use; however, it is interesting to ask why they exhibit different degrees of knowledge-contribution behavior. When an individual has favorable attitude toward a certain group, he/she may be likely to do something good for this group (Isen and Baron, 1991; Kelley and Hoffman, 1997), such as contributing knowledge. However, other studies found that an individual's attitude toward an object may not means that he/she will do something for this object (Lam and Hsu, 2006; Sparks, 2007). In this study, the relationship between attitude and intention does not resemble that one mentioned in Fishbein and Ajzen's (1975) theory of reasoned action, in which the attitude and intention are related to the same target, such as an individual's behavior in question. To our knowledge, how an individual transforms his/her attitude toward a certain VC into knowledge-contribution intention/behavior has not been sufficiently investigated. Based on Baron and Kenny's (1986) suggestion, a mediating variable can be employed to understand how and why the effect of a predictor occurs. Thus, this study chooses the concept of SOVC as such a mediating variable.

As an individual develops a favorable attitude toward a certain P3 VC, he/she will be inclined to use this P3 VC continuously to solve his/her problems. A sense of belonging will then grows from active participation and experience (Wilkinson *et al.*, 1998). Based on Koh and Kim's (2003) definition of SOVC, favorable attitude lets a member perceive influence on other members or on his/her community because it leads to frequent interactions among members or between members and his/her P3 VC. Continuous use of a certain P3 VC from favorable attitude is also regarded as an important prerequisite of a member's immersion. Several studies also indicate that a member's positive judgment, feeling, and past experience toward his/her VC will lead to higher sense of belonging (e.g. Hsiao, 2010; Tsai *et al.*, 2011; Teo *et al.*, 2003; Wilkinson *et al.*, 1998) which represents his/her membership. A member's attitude reflects his/her overall acceptance of a certain P3 VC. Mathwick *et al.* (2008) argue that satisfying the needs for problem solving will foster members' commitment to a problem-solving community. Favorable attitude may allow members to perceive belongingness in their P3 VC, because members whose needs for problem solving are met by the community content are likely to develop closer relationships with their community. Such commitment and belongingness, which show the desire to maintain social relationships within the community, create a continuing sense of obligation to help others (Wasko and Faraj, 2005). This study argues that members' attitudes toward their P3 VC will facilitate their intention to contribute knowledge through the development of SOVC, leading to the following hypotheses:

H2a. Attitude toward the P3 VC positively affects membership dimension of SOVC.

H2b. Attitude toward the P3 VC positively affects the influence dimension of SOVC.

H2c. Attitude toward the P3 VC positively affects the immersion dimension of SOVC.

H3. SOVC has a full and positive mediating effect on the relationship between attitude toward the P3 VC and knowledge-contribution intention.

2.3 Consumer experience

In contrast to traditional marketers' focus on functional features and benefits of products, experiential marketing emphasizes consumer experiences that can provide sensory, emotional, cognitive, behavioral, and relational values (Schmitt, 1999). For experiential marketers, consumers not only engage in rational choices but also are frequently driven by emotions because they are inclined to pursue fantasies, feelings, and fun in their consumption experiences (Holbrook and Hirschman, 1982). As suggested by Norris (1941), consumer value is mainly dependent on what a consumer can experience from consuming a certain product or service, rather than the product or service itself. Recently, several researchers have also addressed the importance of consumer experiences in marketing strategies (e.g. Holbrook, 2000; Joy and Sherry, 2003; Song *et al.*, 2007; Yelkur, 2000). Several studies also employ the perspective of consumer experience to investigate VC-related issues, such as reciprocating behaviors (Chan and Li, 2010), online attitude and perceived service quality (Nambisan and Watt, 2011), and satisfaction (Sanchez-Franco and Rondan-Cataluña, 2010).

In order to clarify the nature of consumer experience, Schmitt (1999) proposed five types of experiences that marketers can create for consumers: sensory experiences through sight, sound, touch, taste, and smell (SENSE); affective experiences that range from mildly positive moods to strong emotions of joy and pride (FEEL); cognitive and problem-solving experiences that engage consumers creatively (THINK); physical experiences that enrich consumers' lives by showing them alternative ways of doing things, lifestyles, and interactions (ACT); and social-identity experiences that result from relating consumers to a broader social system (RELATE). These experiences can be created and conveyed through various mediums, such as mass media, visual and verbal identity, product presence, etc. Several researchers have also employed the consumer experiences perspective to investigate various consumer behaviors (e.g. Evans *et al.*, 2001; Petkus, 2004; Tsaur *et al.*, 2006; Walley *et al.*, 2007; Williams, 2006).

The target of this study is P3 VCs in which members can interact socially and share knowledge with each other. The "audio-visual effect" implied by SENSE is not the major theme of most VCs. Similarly, ACT relates to physical experiences that lead to real-life enrichment, which go beyond what a P3 VC can offer. Since this study intends to investigate the interaction effect between customers' motivations and experiences, and FEEL, RELATE, and THINK are highly related to entertaining, social, and informative motivations, respectively, only these dimensions of customer experience were included in this study based on the parsimonious principle. The authors also discussed this decision with four MIS professors to confirm that it was the correct one.

2.4 U&G theory

Traditional marketers focus on how to design appropriate messages to persuade consumers and change their behavior. However, U&G theory argues that a media audience can take the initiative, instead of being passive in receiving messages, to use the medium to find information to meet their own needs (Katz *et al.*, 1974). This theory delineates audience members' various motivations for media usage and how the gratification develops as a result of fit between their motivations and satisfaction of

needs. The rapid growth of the internet coupled with its higher level of interactivity compared to other traditional mass media has led to the application of the U&G theory to understand the motivations of internet use (Ruggiero, 2000). Many studies have applied the U&G theory to internet use in order to understand its common underlying psychological and behavioral dimensions (e.g. Maignan and Lukas, 1997; Parker and Plank, 2000; Peters *et al.*, 2007; Roy, 2009; Stafford and Stafford, 2001; Stafford *et al.*, 2004; Zinkhan *et al.*, 2003).

U&G theory has multiple underlying constructs. People's motivations for different VCs are different. For example, information need may be more important for professional forums that for social oriented VCs. Some prior studies, for example, propose three key dimensions related to consumer use of the internet, including process, socialization, and content (e.g. Peters *et al.*, 2007; Stafford *et al.*, 2004). This study stands on these three dimensions of U&G theory to explore the motivation of internet users' P3 VC usage. However, the motivations do not necessarily lead to attitude formation and relationship development. Based on the arguments of U&G theory, people will satisfy their needs as they can be met using certain media. This study thus argues that customers' experiences with a P3 VC may play an important role in their attitude formation. In other words, if customers perceive disconfirmation between their expectation prior to (why they use) and experience after (what they perceive) P3 VC usage, they will not have a favorable attitude toward the P3 VC. This study suggests that individuals will be more likely to approve of their VC when their needs are satisfied. That is, a customer's experience with a VC may have moderating effects on the relationship between his/her motivational factors and attitude toward the P3 VC. Gagné and Deci (2005) also argue that psychological needs satisfaction is positively related to positive outcomes.

2.4.1 Process: entertainment. Peters *et al.* (2007) consider the process dimension to be a structural motivation that addresses issues of balancing time and personal schedule. For example, people may use media for the purposes of filling time or structuring their daily activities. Like users of traditional media, such as television and radio, P3 VC users may be motivated by a desire to kill time and, to a lesser extent, to be entertained. The entertainment construct, one of the major motivational factors for using P3 VCs in this study, refers to the extent to which the medium is fun and entertaining for users (Eighmey, 1997; Eighmey and McCord, 1998; Luo, 2002; Peters *et al.*, 2007). Prior U&G studies have demonstrated that media entertainment will enable people to relax and enjoy beautiful things through media usage (e.g. Choi *et al.*, 2009; Ferguson and Peres, 2000; Papacharissi and Rubin, 2000). P3 VCs can be regarded as media for knowledge sharing and interaction, and Chen (2011) suggests that U&G theory is a useful lens for studies of virtual social communities. The FEEL experience, one of Schmitt's five experiences, is related to affective perception from P3 VC usage and will lead to customers' enjoyment and sentiments. As people who have entertaining needs are exposed to affective stimuli, they will be inclined to have positive perceptions about the medium. This study thus argues that the relationship between entertaining motivation and attitude toward P3 VC will be more positive as the FEEL experience is stronger, thereby leading to the following hypothesis:

H4a. The FEEL experience from using P3 VCs positively moderates the relationship between entertaining motivation and attitude toward the P3 VC.

2.4.2 Socialization: social need. Social need is also one of the major motivational factors that explain why people use online problem-solving communities (Mathwick *et al.*, 2008). Wang and Fesenmaier (2004) argue that virtual travel community members' participation in the travel community is driven mainly by social benefits. In addition to information exchange and knowledge sharing, people will also look for emotional support from or establish social relationship with other members in their VCs (Lin, 2008). The RELATE experience involves social interaction and relationship development through consumption. When people who have social needs have satisfying relationships with other members, they will be inclined to have a positive perception about the medium. This study thus argues that the relationship between social need motivation and attitude toward P3 VC will be more positive as the RELATE experience is stronger, thereby leading to the following hypothesis:

H4b. The RELATE experience from using a P3 VC positively moderates the relationship between social need and attitude toward the P3 VC.

2.4.3 Content: information need. Bowman and Willis (2003) argue that the major motivation for VC members' participation is to obtain useful knowledge and information. Several studies have also indicated that information value is most important for internet users' satisfaction (Eighmey and McCord, 1998; Hagel and Armstrong, 1997; McKinney *et al.*, 2002; Romm *et al.*, 1997). The informativeness construct of U&G theory can be defined as the extent to which the medium provides users with resourceful and helpful information (Chen and Wells, 1999; Ducoffe, 1996; Luo, 2002). Lin (2008) also finds out that information need is a major factor for VC members' satisfaction. The THINK experience, one of Schmitt's five experiences, refers to problem solving and convergent and divergent thinking through information stimulation. As people who expect to obtain useful knowledge can solve their problems or have insights through interacting with other members, they will form a positive perception about the medium. This study thus argues that the relationship between information need motivation and attitude toward the P3 VC will be more positive as the THINK experience is stronger, thereby leading to the following hypothesis:

H4c. The THINK experience from using a P3 VC positively moderates the relationship between information need and attitude toward the P3 VC.

The resulting research model is presented in Figure 1.

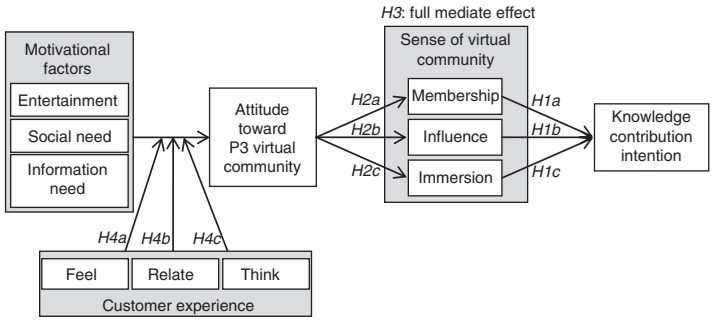


Figure 1.
Research model

3. Research methodology

3.1 Data collection

This study chose a well-known professional IT P3 VC in Taiwan, the ITHelp community, as the target for data collection. ITHelp was founded by *iThome*, which is the most important and popular weekly information technology magazine in Taiwan. Most VCs in Taiwan are multi-purpose and employed for knowledge sharing rather than problem solving; that is to say, most VCs in Taiwan involve various topic discussions and sometimes are prone to facilitate social interaction among their members. The primary purpose of ITHelp is to solve the problems faced by IT professionals of various business domains through online sharing and discussion. ITHelp was founded exclusively to facilitate IT-related knowledge sharing and problem solving by bringing together IT professionals working on similar IT problems. ITHelp is one of the most important IT knowledge P3 VC and suitable for being the research target. An online survey linked from the homepage of this community was used through the cooperation of the vendor of this community. The survey was posted online for a 15-week period during the first quarter of 2009 and prevented multiple submission by IP address check. In order to stimulate participation, this study provided each respondent an opportunity to win a gift coupon valued at more than NTD 100.

In all, 262 respondents participated in this study;43 responses were discarded as a result of missing values or invalid responses, with a total of 219 valid responses remaining in the data set for further analyses. Of all the respondents, 193 were male and 26 were female. Over 60 percent were under 30 years old and 58 percent used the community investigated in this study one to three hours per day. Besides, more than one-third of the respondents spend less than one hour in VC per day. According to the report of Taiwan Network Information Center (TWNIC) (2011), about 50.04 percent of internet users spend less than 1 hour and 32.28 percent spend 1-3 hours in VC per day, which is similar to the usage pattern of the sample of this study. Further demographic information is shown in Table I.

3.2 Measurement development

In this study, all constructs were measured using multiple items, and a five-point Likert scale was used to measure three motivational factors (entertainment, social need, and information need), three customer experiences (FEEL, RELATE, THINK), attitude toward P3 VC, three dimensions of SOVC (membership, influence, and immersion), and knowledge-contribution intention. The items for each construct were drawn from pre-validated measures in relevant studies (see Appendix 1 for all measurement items). All the items were then translated into Chinese and revised by the authors and three MIS – major doctoral students so as to reflect cultural subtleties. The Chinese version were then pretest with several respondents who had online VC-related experiences was conducted to ensure that the question wordings and the translation were comprehensible, logical consistencies, and contextual relevance.

4. Analyses

4.1 Convergent and discriminant validity

According to the two-step procedure recommended by Anderson and Gerbing (1988), the authors estimated and re-specified the measurement model prior to examining the structural model. A confirmatory factor analysis (CFA) was used to assess the

	Characteristics	Frequency	%
Gender	Male	193	88.1
	Female	26	11.9
Age	Under 20 years old	9	4.1
	21-30	124	56.6
	31-40	62	28.3
	41-50	21	9.6
	Over 51	3	1.4
Occupations	Student	36	16.4
	IT related	90	41.1
	Military, government and teacher	6	2.7
	Business/finance	19	8.7
	Service industry	20	9.1
	Manufacturing industry	24	11
	Others	24	11
Education	High school or below	19	8.7
	University	156	71.2
	Graduate school	37	16.9
	PhD	7	3.2
Average time of internet use (per day)	<1 hour	5	2.3
	1-3	19	8.7
	3-5	41	18.7
	5-7	70	32
	7-9	32	14.6
	>9	52	23.7
Average time of community use (per day)	<1 hour	75	34.2
	1-3	127	58
	3-5	9	4.1
	5-7	5	2.3
	7-9	2	0.9
	>9	1	0.5
Community history	<0.5 year	57	26
	0.5-1	117	53.4
	1-2	26	11.9
	2-3	12	5.5
	>3	7	3.2

Note: The number of respondents = 219

Table I. Demographic information

convergent and discriminant validity of the operationalization. Three reverse items from FEEL, RELATE, THINK were deleted because their factor loadings were <0.6 (Sharma, 1996). The CFA result indicates that the factor loadings of all measurement items range from 0.73 to 0.97, which indicates acceptable convergent validity (see Appendix 2 for the factor structure matrix of loadings and cross-loadings). The authors also assessed construct reliability by calculating composite reliability to assess whether the specified indicators were sufficiently representative of their respective latent factors, as suggested by Segars (1997). These estimates of composite reliability of latent factors ranged from 0.87 to 0.97, well above the threshold of 0.70 suggested by Jöreskog and Sörbom (1989). In addition, Cronbach's α of all factors also exceeded the required minimum of 0.7 (range from 0.80 to 0.95), thus, acceptable construct reliability is implied (as shown in Table II).

Construct	Cronbach's α	AVE	CR	ENT	SOC	IFN	FEE	REL	THK	ATT	MBS	INF	IMM	KCI
ENT	0.90	0.63	0.89	0.79										
SOC	0.87	0.62	0.91	0.48	0.79									
IFN	0.95	0.88	0.97	−0.07	−0.09	0.94								
FEE	0.85	0.87	0.93	0.26	0.14	−0.07	0.93							
REL	0.89	0.90	0.95	0.26	0.11	−0.09	0.15	0.95						
THK	0.83	0.86	0.92	−007.	−0.14	0.15	−0.11	−0.03	0.93					
ATT	0.87	0.68	0.91	−0.56	−0.29	0.09	−0.22	−0.18	0.18	0.82				
MBS	0.80	0.63	0.87	0.26	0.07	−0.01	0.21	0.13	−0.11	0.43	0.79			
INF	0.90	0.77	0.93	0.21	0.17	−0.02	0.14	0.11	−0.11	0.43	0.12	0.88		
IMM	0.84	0.70	0.90	0.26	0.14	−0.02	0.13	0.02	−0.08	0.44	0.18	0.20	0.84	
KCI	0.91	0.73	0.93	0.21	0.25	−0.01	0.08	0.16	0.01	0.27	0.21	0.26	0.23	0.85

Table II.
Correlation matrix, Cronbach's α, AVE and composite reliability

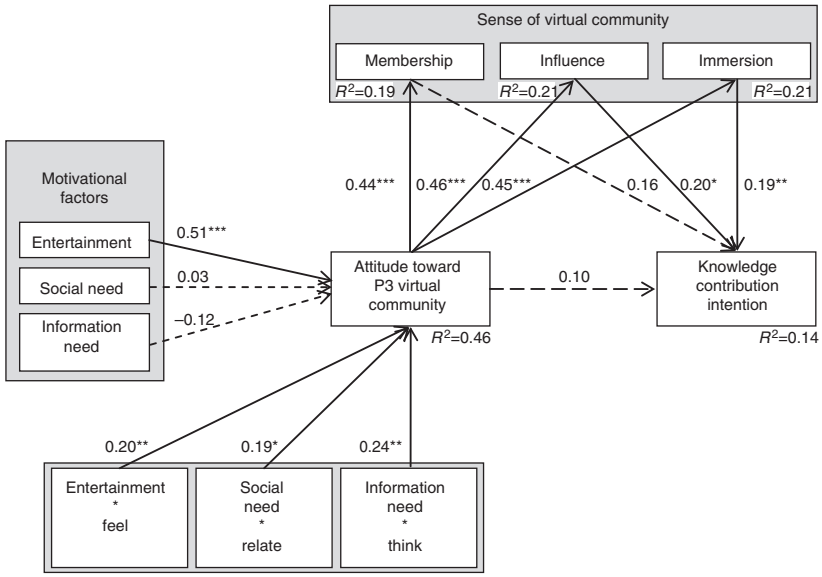
Notes: Square root of AVE for each construct is shown in the diagonal of the correlation matrix. ENT, entertainment; SOC, social need; IFN, information need; FEE, feel experience; REL, relate experience; THK, think experience; ATT, attitude toward VC; MBS, membership; INF, influence; IMM, immersion; KCI, knowledge-contribution intention

However, composite reliability does not reflect the degree of variance that is captured by the construct in relation to the amount of variance due to measurement error (Fornell and Larcker, 1981). Thus, an average variance extracted (AVE) estimate is employed to obtain this information. An AVE estimate of 0.50 or higher indicates acceptable validity for a construct's measure (Fornell and Larcker, 1981). All AVE estimates in this study (from 0.62 to 0.90) were well above the cut-off value, which suggests that all measurement scales have convergent validity. In order to assess discriminant validity among the constructs, the authors calculated the square root of AVE for each construct and compared them with inter-construct correlations for each pair of constructs. The result shows that square roots of all AVE estimates for each construct are greater than inter-construct correlations; thus, discriminant validity is supported (as shown in Table II).

4.2 Hypotheses test

This study employs the partial least squares (PLS) method conducted by VisualPLS 1.04b1 (Fu, 2006) to test the hypotheses in the conceptual model. This study intends to investigate the interaction between VC members' expectations prior to and perceptions after VC usage. As argued by Chin *et al.* (2003), the product-indicator approach of covariance-based structural equation modeling (SEM) (e.g. LISREL) may be problematic because the underlying assumption of uncorrelated error terms among indicators cannot hold true for moderator analysis. Moderating effects can also be identified by employing the multiple-group approach in SEM (e.g. Homburg and Stock, 2005). However, artificial transformation of a continuous variable into a qualitative one may lead to statistical information loss. Thus, PLS is better suited than covariance-based SEM for the testing of moderating effects and also employed in several information systems (IS) studies (e.g. Limayem *et al.*, 2007).

As suggested by Chin *et al.* (2003), the product items of independent variable and moderating variable were then included to test the moderating effect. As shown in Figure 2, three out of 13 paths are not significant and the R^2 ranges from 14 to 47 percent. In the social science, low R^2 is not uncommon, especially for cross-sectional analysis. Several studies report low R^2 in the range of 0.1-0.4 and still are considered



Notes: R^2 represents the variation explained in endogenous constructs. Solid lines indicate significant paths. Dashed lines indicate non-significant paths. *p<0.05; **p<0.01; ***p<0.001

Figure 2.
Structural model estimation

acceptable (e.g. Lin *et al.*, 2011; Johnston and Warkentin, 2010). First, the relationships between motivational factors and attitude toward P3 VC are positively moderated by three customer experiences, thereby supporting the fits between customer's motivations and needs satisfaction (*H4a-c* are supported). It is interesting to note that two out of three direct effects of motivational factors are not significant, which implies the importance of moderating factors. Second, results indicate that the attitude toward a P3 VC is significantly related to all three dimensions of the SOVC (*H2a-c* are supported). Third, the positive effects of influence and immersion on knowledge-contribution intention are supported (*H1b* and *H1c* are supported), while the relationship between membership and knowledge-contribution intention is not significant (*H1a* is not supported). Moreover, the relationship between attitude toward the P3 VC and knowledge-contribution intention is not significant. This study further re-examined the research model by excluding the SOVC. Baron and Kenny (1986) suggest that the mediation effects can be confirmed according to four conditions. The first condition requires that the independent variables affect the mediators. The second condition exists if the mediators affect the dependent variables. The third mediation condition requires that the independent variables affect the dependent variable. Finally, mediation exists if the direct paths from the independent variables to the dependent variables become insignificant (i.e. full mediation) or reduce (partial mediation) when we include the mediators in the model. The results show that attitude toward the P3 VC has a positive and significant effect on knowledge-contribution intention without SOVC, indicating the full mediating role of SOVC in the research model (*H3* is supported).

5. Conclusion

5.1 Summary of results

In the era of ubiquitous networks, internet users can easily interact and share with each other via various VCs. To face the competition in the network environment, how a P3 VC enhances the efficiency of knowledge and resource exchange among its members is the top issue for P3 VC management and development. As a P3 VC gathers a rich amount of knowledge, it can lure more members and make itself sustainable. This study thus investigated the antecedents of P3 VC members' attitude formation through the interaction between their expectations prior to (why they use) and perceptions after (what they perceive) P3 VC usage. The role of SOVC in members' knowledge-contribution intention was also addressed.

Overall, the results show that members form favorable attitudes toward VCs as their motivations are satisfied through P3 VC use. In other words, a good fit between P3 VC members' expectations prior to and experiences after P3 VC usage is very important for the P3 VC vendor. As P3 VC members gain more profound experiences from P3 VC use (FEEL, RELATE, and THINK experiences), their motivations (entertainment, social need, and information need) will have stronger effects on their attitudes toward the VC, thereby supporting the arguments of U&G theory. Furthermore, this study also determined the interesting role of SOVC in P3 VC members' knowledge contribution. The results show that the dimensions of SOVC, except for the membership dimension, play a full mediating role in the relationship between attitude toward the P3 VC and knowledge-contribution intention. That is, attitude toward the P3 VC can affect knowledge-contribution intention only through SOVC. A member's favorable attitude toward his/her P3 VC may facilitate his/her social awareness and belongingness, which then leads to a stronger intention to contribute knowledge for the shared good. It is important to note that the relationship between attitude toward the P3 VC and knowledge-contribution intention is insignificant, implying the importance of SOVC.

H1a is the only one hypothesis not supported by statistical analysis. That is, the relationship between membership and knowledge-contribution intention is not significant. The possible explanation is that membership may not ensure that members will make commitments of time and effort to do something good for their community. Bases on the results, influence and immersion are more critical determinants of knowledge sharing effort. The accumulations of these two dimensions of SOVC, different from membership, seem to be more time consuming. As long as a member with stronger influence and high immersion, he/she has invested a lot of time in his/her VC and will be inclined to contribute his/her knowledge. However, membership may still be developed for a new comer, which not necessary lead to higher intention of knowledge contribution.

5.2 Theoretical implications

The results bring out several theoretical implications. To our knowledge, prior studies have not investigated P3 VCs through the perspective of members' experiences. The results of this study can be a basis for follow-up studies in this area, and can enhance the explanatory ability of knowledge-contribution behavior. This study also argued that members' motivations do not necessarily lead to attitude formation toward P3 VCs and that members' experiences may have significant effects on their perception of a P3 VC. The interaction between motivations and experience needs further examination in follow-up studies in order to ensure the robustness of the result of this

study. Furthermore, the mediating role of SOVC in this study can enhance the understanding of how to encourage people to contribute their knowledge in a P3 VC environment. Although there are several facilitators of knowledge contribution (Chen and Hung, 2010; Chow and Chan, 2008; He and Wei, 2009), SOVC is most important for the development of online social capital that benefits both P3 VCs and their members.

5.3 Managerial implications

This study also has several implications for P3 VC managers. Offering a rich amount of knowledge and various functions to P3 VC members is not enough to create a competitive advantage because members will be attracted to competitors with similar performance. P3 VC managers need to aim at creating pleasant experiences for their members, such as offering customized services and useful information to address members' problems, maintaining an open and unrestricted forum for members' discussions and interactions, and holding various online or offline activities to enhance members' social interactions. Experiences from using the P3 VC are personal and cannot be easily reproduced by competitors, thereby leading to favorable attitudes and higher satisfaction toward the P3 VC. However, members' positive perceptions about a P3 VC cannot ensure that they are inclined to do something good for the community. As indicated by the results of this study, attitude toward the P3 VC is not significantly related to knowledge-contribution intention. Knowledge-contribution intention will be strengthened only when the members who have a favorable attitude toward the P3 VC form SOVC through participation in the activities of the P3 VC or interacting with other members.

The mediating role of SOVC implies that P3 VC managers should foster their members' belongingness and consciousness of the kind proposed by Muñiz and O'Guinn (2001). In P3 VCs, particularly in highly technical communities of practice, this feeling of belonging to a group tends to stem from intensive discussion of certain topics and online interaction (Mathwick *et al.*, 2008). P3 VC managers can initiate interesting and challenging topics for discussion or encourage members' participation through reward mechanisms in order to enhance members' involvement and re-patronage. Moreover, the members who frequently share their knowledge or solve other members' problems are usually opinion leaders. Koh and Kim (2003) suggest that leaders' enthusiasm is positively related to the development of SOVC. P3 VC managers can invite these opinion leaders to act as the managers of discussion boards in order to facilitate members' participation and knowledge sharing with higher involvement, thereby contributing to the growth of the P3 VC's knowledge base and attracting more newcomers.

5.4 Limitations

This study has certain limitations, which need to be noted, despite the cautious steps that were taken during the theoretical deduction and data collection. First, Schmitt's five types of experiences cannot be completely adapted to investigate online customers' behavior; thus, two dimensions were discarded in this study. Future studies may develop a new construct for online customers' experience. Second, the conclusions are restricted to a P3 VC that involves IT-related issues, which focusses problem solving rather than being socially oriented. Members of IT P3 VCs are usually highly innovative and enthusiastic about new IT products, which is quite different from the membership of other P3 VCs. The research questions deserve further investigation

through an examination of other kinds of P3 VCs. Third, as this study employed a cross-sectional design to examine consumers' online trust formation, all the hypothetical causal relationships can only be inferred rather than proven. Future longitudinal studies should therefore assess members' experiences, attitudes, SOVC, and knowledge contribution at several points in time to generate more insights into the rate and curve structure of decay along with the factors that contribute to it. Fourth, according to world knowledge competitive index (Huggins *et al.* 2008), the index of broadband penetration in Taiwan is 157.7, which ranks top six in the world. This indicates online consumer behaviors and services are worthy to be investigated. However, cultural factors should be taken into account while interpreting the results because this study was conducted in Taiwan. The cultural factors usually overlooked in western research are particularly important for social science studies. Investigating the extent to which these factors may influence the results could bring further insights. Finally, ITHelp founded by *iThome* in 2005 is a young VC in Taiwan, it is reasonable that more than 50 percent of the respondents participate in ITHelp less than one year. However, these low-experience respondents may lead to restricted results. That is to say, the results of this study may be restricted to naive VC members' knowledge-contribution intention. The research model may be further reexamined through collecting more high-experience respondents to enhance our understanding of online knowledge-contribution behavior.

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Appendix 1

Variables	Items	Source
Entertainment	EN1: I hope to participate in a virtual community that is entertaining EN2: I hope to participate in a virtual community that is enjoyable EN3: I hope to participate in a virtual community that is pleasing EN4: I hope to participate in a virtual community that is fun to use EN5: I hope to participate in a virtual community that is exciting	Ducoffe (1996)
Social need	SN1: I hope to participate in a virtual community in which I can seek emotional support SN2: I hope to participate in a virtual community in which I can find friends SN3: I hope to participate in a virtual community in which I can build relationships with other members SN4: I hope to participate in a virtual community in which I can develop group attachment SN5: I hope to participate in a virtual community in which I can express my identity SN6: I hope to participate in a virtual community in which I can increase self esteem/respect	Wang and Fesenmaier (2004)
Information need	IN1: I hope to participate in a virtual community in which I can quickly and easily access to large volumes of information IN2: I hope to participate in a virtual community in which I can obtain useful information IN3: I hope to participate in a virtual community in which I can learn a lot IN4: I hope to participate in a virtual community in which I can access to helpful information IN5: I hope to participate in a virtual community in which I can acquire information inexpensive	Luo (2002)

(*continued*)

Table AI.
Measurement items

Variables	Items	Source
FEEL experience	FE1: This virtual community tries to put me in a certain mood	Schmitt (1999)
	FE2: This virtual community makes me respond in an emotional manner	
	FE3: This virtual community does not try to appeal to feelings.	
RELATE experience	RE1: This virtual community tries to get me to think about relationships	Schmitt (1999)
	RE2: I can relate to other people through this virtual community	
	RE3: This virtual community does not try to remind me of social rules and arrangements	
THINK experience	TH1: This virtual community tries to intrigue me	Schmitt (1999)
	TH2: This virtual community stimulates my curiosity	
	TH3: This virtual community does not try to appeal to my creative thinking	
Attitude toward VC	AT1: This virtual community is beneficial for me	Ajzen (2002)
	AT2: This virtual community is pleasant for me	
	AT3: This virtual community is good for me	
	AT4: This virtual community is valuable for me	
	AT5: This virtual community is enjoyable for me	
Membership	MB1: I feel as if I belong to this virtual community	Koh and Kim (2003)
	MB2: I feel membership in this virtual community	
	MB3: I feel as if the members of this virtual community are my close friends	
	MB4: I like the members of this virtual community	
Influence	IF1: I am well known as a member of this virtual community	Koh and Kim (2003)
	IF2: I feel that I control this virtual community	
	IF3: my postings on this virtual community are often reviewed by other members	
	IF4: replies to my postings appear on this virtual community frequently	
Immersion	IM1: I spend much time on-line in this virtual community	Koh and Kim (2003)
	IM2: I spend more time than I expected navigating this virtual community	
	IM3: I feel as if I am addicted to this virtual community	
	IM4: I have missed classes or work because of this virtual community activities	
Knowledge contribution intention	KC1: I intend to frequently participate in knowledge sharing activities in this virtual community.	Hsu *et al.* (2007)
	KC2: I intend to spend a lot of time conducting knowledge sharing activities in this virtual community	
	KC3: when participating in this virtual community, I intend to actively share my knowledge with others	
	KC4: when discussing a complicated issue, I intend to be involved in the subsequent interactions	
	KC5: I intend to involve myself in discussions of various topics rather than specific topics	

Table AI.

Appendix 2

Scale items	ENT	SocNd	InforNd	FEEL	RELATE	THINK	ATTITUDE	MB	INF	IMS	KCI
Process1	0.89	0.48	−0.08	0.19	0.23	0.03	0.50	0.21	0.16	0.19	0.23
Process2	0.92	0.47	−0.11	0.22	0.28	0.03	0.45	0.20	0.17	0.17	0.18
Process3	0.91	0.49	−0.04	0.17	0.28	0.06	0.47	0.22	0.18	0.20	0.20
Process4	0.75	0.35	−0.06	0.21	0.16	0.16	0.57	0.25	0.25	0.25	0.18
Process5	0.80	0.30	−0.04	0.30	0.20	0.02	0.42	0.24	0.13	0.32	0.10
Soc1	0.41	0.74	0.01	0.18	0.09	0.14	0.23	0.09	0.16	0.12	0.17
Soc2	0.44	0.74	−0.12	0.06	0.07	0.14	0.32	0.09	0.20	0.18	0.28
Soc3	0.39	0.73	−0.11	0.12	0.11	0.18	0.32	0.07	0.20	0.14	0.27
Soc4	0.38	0.81	−0.06	0.14	0.05	0.08	0.23	0.03	0.17	0.08	0.17
Soc5	0.33	0.86	−0.06	0.09	0.10	0.08	0.14	0.04	0.05	0.07	0.18
Soc6	0.38	0.83	−0.06	0.07	0.11	0.08	0.17	0.04	0.05	0.10	0.11
Content1	−0.09	−0.12	0.97	−0.09	−0.05	−0.15	−0.10	−0.09	0.01	−0.04	0.02
Content2	−0.11	−0.15	0.96	−0.09	−0.08	−0.16	−0.11	−0.08	−0.05	−0.05	−0.00
Content3	−0.08	−0.10	0.97	−0.09	−0.12	−0.14	−0.09	−0.12	−0.03	−0.01	−0.02
Content4	−0.06	−0.10	0.97	−0.04	−0.08	−0.16	−0.11	−0.09	−0.03	−0.03	−0.01
Content5	−0.01	0.08	0.83	0.01	−0.12	−0.10	−0.02	−0.07	0.01	0.03	−0.04
Feel1	0.22	0.13	−0.06	0.93	0.13	0.10	0.18	0.18	0.13	0.14	0.07
Feel2	0.26	0.13	−0.06	0.93	0.15	0.11	0.23	0.21	0.13	0.10	0.09
Rel1	0.23	0.09	−0.07	0.12	0.95	0.05	0.15	0.10	0.10	−0.00	0.14
Rel2	0.29	0.12	−0.10	0.17	0.95	0.00	0.20	0.14	0.10	0.03	0.17
Think1	0.05	0.16	−0.16	0.14	−0.01	0.93	0.14	0.07	0.12	0.05	−0.06
Think2	0.08	0.10	−0.11	0.07	0.06	0.93	0.18	0.13	0.08	0.09	0.04
Att1	0.40	0.20	−0.06	0.12	0.13	0.09	0.85	0.37	0.42	0.47	0.24
Att2	0.55	0.33	−0.06	0.17	0.10	0.16	0.78	0.33	0.28	0.30	0.17
Att3	0.44	0.19	−0.13	0.13	0.21	0.24	0.90	0.41	0.41	0.40	0.22
Att4	0.44	0.17	−0.06	0.19	0.17	0.11	0.84	0.40	0.34	0.37	0.21
Att5	0.52	0.36	−0.06	0.32	0.14	0.12	0.75	0.27	0.32	0.26	0.27
Mbship1	0.16	0.02	0.04	0.06	0.11	0.03	0.28	0.79	0.09	0.10	0.13
Mbship2	0.19	0.07	−0.03	0.15	0.13	0.18	0.36	0.82	0.09	0.16	0.18
Mbship3	0.24	0.04	−0.20	0.22	0.09	0.03	0.34	0.78	0.14	0.15	0.21
Mbship4	0.25	0.11	−0.13	0.24	0.08	0.11	0.39	0.77	0.06	0.16	0.13
Influ1	0.23	0.19	−0.07	0.17	0.06	0.14	0.52	0.20	0.87	0.32	0.21
Influ2	0.25	0.13	−0.08	0.13	0.04	0.13	0.47	0.15	0.87	0.28	0.21
Influ3	0.13	0.14	0.04	0.09	0.15	0.06	0.25	0.04	0.88	0.03	0.26
Influ4	0.12	0.14	0.04	0.10	0.11	0.07	0.28	0.04	0.89	0.06	0.24
Imsion1	0.26	0.20	0.02	0.11	0.01	0.11	0.39	0.16	0.21	0.79	0.33
Imsion2	0.22	0.12	−0.03	0.05	−0.04	0.12	0.42	0.12	0.21	0.77	0.23
Imsion3	0.20	0.09	−0.03	0.12	0.02	0.01	0.33	0.15	0.15	0.89	0.12
Imsion4	0.21	0.08	−0.02	0.15	0.05	0.03	0.34	0.17	0.09	0.89	0.12
Kci1	0.25	0.21	−0.03	0.08	0.16	−0.03	0.32	0.22	0.21	0.19	0.87
Kci2	0.21	0.19	−0.01	0.14	0.12	0.08	0.29	0.22	0.28	0.30	0.82
Kci3	0.14	0.20	0.02	0.00	0.07	−0.10	0.18	0.14	0.21	0.14	0.88
Kci4	0.13	0.21	−0.01	0.12	0.16	0.01	0.16	0.15	0.17	0.18	0.84
Kci5	0.16	0.23	−0.01	0.02	0.18	0.01	0.19	0.15	0.24	0.19	0.86

Table AII.
Factor structure matrix of loadings and cross-loadings

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