



## Explaining members' proactive participation in virtual communities

Hsien-Tung Tsai<sup>a</sup>, Peiyu Pai<sup>b,\*</sup>

<sup>a</sup>Department of Business Administration, National Taipei University, No. 151, University Rd., San Shia, Taipei, 237 Taiwan, Taiwan

<sup>b</sup>Department of Business Administration, National Chengchi University, No. 64, Sec. 2, Zhi-Nan Rd., Taipei, 116 Taiwan, Taiwan

Received 22 December 2010; received in revised form 2 December 2012; accepted 10 December 2012

Communicated by E. Motta

Available online 27 December 2012

### Abstract

Understanding members' proactive participation in virtual communities is important to both academics and practitioners. This study extends virtual community research by proposing and testing a model that outlines the antecedents of members' proactive participation behavior and incorporates mediating mechanisms and moderating effects. The findings, based on both qualitative and quantitative data, reveal that social, hedonic, and utilitarian community attributes significantly influence proactive participation through community identification and relationship satisfaction. Furthermore, the conversion of community identification into proactive participation behavior depends on the public recognition of contributions. The authors conclude with some managerial and research implications. © 2012 Elsevier Ltd. All rights reserved.

**Keywords:** Identification; Proactive participation behavior; Recognition of contributions; Satisfaction

### 1. Introduction

Understanding members' proactive participation in virtual communities is important to both academics and practitioners (Preece and Shneiderman, 2009; Wiertz and de Ruyter, 2007). Prior research has shown that members' proactive participation leads to positive organizational and community outcomes, such as sharing knowledge between peers for collaboration (Teo et al., 2003; Yang and Chen, 2008), providing ideas for product innovation (Nambisan and Baron, 2009), facilitating new product diffusion (Thompson and Sinha, 2008), or reducing customer service costs by enabling peer-to-peer problem solving (Dou and Krishnamurthy, 2007; Hagel and Armstrong, 1997; Wiertz and de Ruyter, 2007). Recent research on community behavior specifically reinforces the notion that the success

of virtual communities critically depends on the proactive participation of their members (e.g., Bock et al., 2005; Chiu et al., 2006; Wasko and Faraj, 2005).

Despite the importance of members' proactive participation, its antecedents are not well understood, largely due to the predominant focus on reactive concepts of participation behavior (cf. Wiertz and de Ruyter, 2007). For example, substantial research has investigated reactive forms of participation, including continuing to use a virtual community (Cheung and Lee, 2009) or viewing activity (Koh et al., 2007). This study instead aims to enhance understanding of proactive participation (e.g., creating articles, sharing photos, sending gifts) and thus extends previous research in four ways. First, we simultaneously investigate social, hedonic, and utilitarian community characteristics as antecedents of proactive participation based on an extensive review of literature on virtual communities, as well as through in-depth interviews with virtual community members. Neither researchers nor practitioners know whether these community attributes play unique roles or what their relative importance might be. A greater understanding of these varied determinants of

\*Corresponding author. Tel.: +886 2 2939 3091x81100;  
fax: +886 2 2939 8005

E-mail addresses: [hstsai@gm.ntpu.edu.tw](mailto:hstsai@gm.ntpu.edu.tw),  
[f90724040@ntu.edu.tw](mailto:f90724040@ntu.edu.tw) (H.-T. Tsai), [p.pai@nccu.edu.tw](mailto:p.pai@nccu.edu.tw) (P. Pai).

proactive participation can help managers support members in such critical behavior (Preece and Shneiderman, 2009).

Second, we investigate the mediating processes associated with members' decisions to participate proactively in a virtual community. Through a critical examination of existing theory and social psychology research, we identify satisfaction and identification as potential mediators of member participation processes. Although empirical evidence linking community attributes and member participation decisions has begun to accumulate (e.g., Dholakia et al., 2004; Jang et al., 2008), this study, to the best of our knowledge, represents the first attempt to test psychological and social mediating processes empirically. By examining satisfaction and identification as possible mediating mechanisms, this study helps clarify the theoretical relationship of the key variables, as well as how different factors (i.e., social, hedonic, and utilitarian community factors) together explain the dependent, behavioral variable (Todd and Benbasat, 1999).

Third, we test the moderating effects of public recognition of contributions on the relationships between mediators (i.e., satisfaction and identification) and proactive participation behavior. Public recognition of contributions refers to "a public expression of appreciation given by a group to individuals who undertake desired behaviors" (Fisher and Ackerman, 1998, p. 264). Although satisfaction and community identification may guide proactive participation behavior, the empirical evidence of this link has been inconsistent (see Chiu et al., 2006; Wasko and Faraj, 2005; Wiertz and de Ruyter, 2007), which suggests that the intricacies associated with translating satisfaction and identification into participation in virtual communities have not been modeled with sufficient precision. Considering the voluntary social context of virtual communities, we theorize that public recognition may alter the satisfaction–behavior and identification–behavior relationships. This research, as one of the first empirical studies to address this issue, responds to calls (e.g., Wiertz and de Ruyter, 2007) for a more complex framework that models the intricacies of the exchange process and thus reveals the nature of participation behavior in a virtual community.

Fourth, we conduct our tests using combined data about members' objective behavior and self-reported survey data. Members' self-reported data are common inputs in academic and commercial research, because they represent easy-to-collect proxies of behavior. However, these self-reported data do not predict future behavior accurately (Bagozzi, 2011). Our strategy therefore provides a means to separate the collection of independent and dependent variables, which reduces the potential for same-source or common method biases and thereby increases causal inferences (Rindfleisch et al., 2008).

## 2. Theoretical background and hypotheses

As Fig. 1 shows, the proposed framework addresses several research gaps. Based on a literature review and

in-depth interviews, we propose that social, hedonic, and utilitarian community characteristics are likely to affect members' satisfaction and identification with the community, which then lead to proactive participation behavior. The hypothesized role of such dual mediating mechanisms is consistent with relationship management research (e.g., Williams and Anderson, 1991). Homburg et al. (2009) also argue that both relationship satisfaction-based and social identification-based mediating paths account for important relationship management processes. To complement existing conceptual approaches and focus explicitly on the role of social and psychological mediating mechanisms, we adopt a similar social–psychological lens and propose dual mediating mechanisms underlying community characteristics and proactive participation behavior.

### 2.1. The roles of satisfaction and identification in proactive participation behavior

#### 2.1.1. Satisfaction

Satisfaction is a positive affective state that results from a global evaluation of all experiences with the virtual community (van Dolen et al., 2007). In contrast with transaction-specific satisfaction, overall satisfaction pertains to the relationship, or the cumulative effect of a set of discrete community encounters or interactions among community members over a period of time. Theoretical research shows that customer satisfaction influences the variables that indicate a long-term relationship orientation and voluntary behaviors to endorse and facilitate the purchase or use of a firm's offering (e.g., Andersen, 2005; Ganesan, 1994; Heskett et al., 2002; Mittal and Kamakura, 2001). In virtual communities, satisfaction should play a similarly significant role in predicting members' proactive participation behavior.

Several theoretical explanations support the relationship between member satisfaction and proactive behaviors. Social psychologists argue that positive and proactive behaviors are most likely to be triggered when a person experiences a generalized mood state characterized by positive affect (Bateman and Organ, 1983; Clark and Isen, 1982). Because satisfaction with community participation is a positive affective state, more satisfied members should display more contribution behaviors. Furthermore, positive moods are associated with creative problem solving (Isen and Baron, 1991), so satisfied members should produce new ideas in response to others' questions. Some research on community participation also suggests that satisfactory participation experiences decrease the psychological distance between the self and others and influence decisions about future engagement (e.g., McAlexander et al., 2002). For example, Chan and Li (2010) find that that members' satisfaction with community relationships leads to strong, unique, and non-substitutable bonds, which trigger proactive participation behavior.

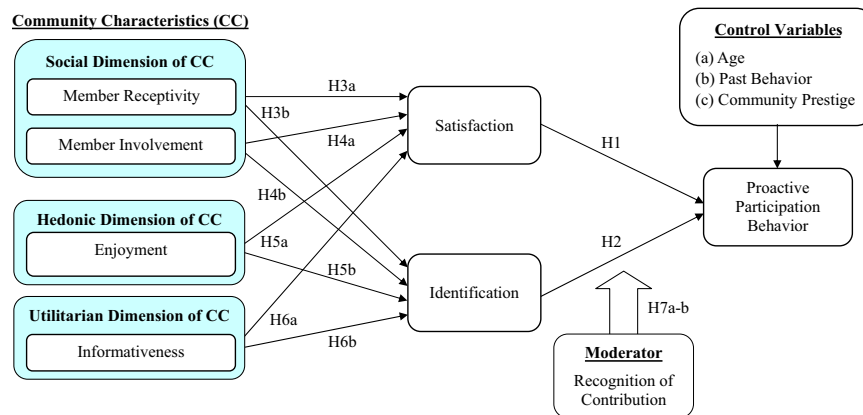


Fig. 1. Conceptual framework.

**H1.** Satisfaction positively influences members' proactive participation behavior.

### 2.1.2. Identification

Community identification can be an important social mechanism that shapes members' proactive participation behavior, especially online, where tangible elements are less salient. Ashforth and Mael (1989) conceptualize organizational identification as a person's perception of "oneness or belongingness" with the organization. Bhattacharya and Sen (2003) further extend the identification concept to develop a framework of customer–company identification that describes the degree to which customers perceive themselves and the focal company as sharing the same defining attributes. In this study, community identification is defined as the person's construal of himself or herself as a member—that is, as "belonging" to the virtual community (Algesheimer et al., 2005, p. 20). Several studies also propose that group identification involves both cognitive self-categorization and affective commitment (e.g., Algesheimer et al., 2005). Cognitive self-categorization occurs through comparisons of personal defining characteristics with those that define the virtual community (Bagozzi and Dholakia, 2006). As a person becomes increasingly aligned with a community, his or her personal identity grows less salient, through a process of depersonalization (Hogg and Hains, 1996). Affective commitment takes this process a step further, developing into feelings of attachment and belongingness (Algesheimer et al., 2005).

Identification then motivates people to engage in helpful and supportive behaviors aimed toward in-group members (Ashforth and Mael, 1989; Bhattacharya and Sen, 2003; Scott and Lane, 2000). These supportive behaviors include promoting the community and volunteering to undertake extra effort for its common good. Identification-based relationships also entail active involvement in community self-governance. Responsible members are well informed about issues affecting the community, contribute information to other members, and encourage similar behaviors from others. Extant research on identification reveals that

members with strong community identification aim to communicate positive aspects of their affiliation to relevant audiences (e.g., Ahearne et al., 2005; Algesheimer et al., 2005). Consequently, members identifying with their community have a vested interest in its success. Their decision to proactively participate in the virtual community is a manifestation of their voluntary effort to achieve this result (Tajfel and Turner, 1986).

**H2.** Members' identification with the virtual community positively influences members' proactive participation behavior.

### 2.2. Antecedents of satisfaction and identification

To gain a better understanding of the antecedents of proactive participation, we conducted interviews with eight members of travel and gourmet virtual communities. These members had participated for between four months and five years. The three men and five women represent a broad span of ages, from 17 to 50 years, and a variety of occupations (e.g., student, software engineer, teacher, sales, homemaker). The structured interviews lasted between one and two hours and began with a brief explanation of the purpose of the study. To initiate the discussion, we asked respondents to answer questions such as "What members' behaviors are beneficial to a virtual community?" "Could you please indicate the factors that influence the behaviors you mentioned in the previous question?" and "Which factors motivate members to actively participate in the virtual community?" Additional questions prompted interviewees to provide examples of their involvement in community activities and their roles in virtual communities.

After all eight interviews were conducted, both authors examined the transcripts carefully many times to highlight key phrases. The goal of this key phrase selection was to identify recurring thoughts, ideas, and perceptions that each respondent expressed in replying to the questions (Gwinner et al., 1998). By integrating theory developed in several disciplines (e.g., Dholakia et al., 2004; McAAlexander et al., 2002) with the results of the in-depth interviews,

we derived three dimensions of community characteristics (i.e., social, hedonic, and utilitarian) that influence members' proactive participation in virtual community settings. Selected excerpts of each of the interview participants' comments appear in Table A1.

### 2.2.1. Member receptivity

Member receptivity, a social community characteristic, represents the extent to which the community members listen to one another and are open to others' ideas (Burgoon et al., 2000; van Dolen et al., 2007). One interviewee, a long-term member of the travel virtual community, described the importance of member receptivity for proactive participation processes: "*Even though sometimes there are different voices in a group discussion, the members will respect the various views. There are no challenging conversations in the community. That is very important to me! If the members are not open-minded, not willing to listen to different ideas, I won't share my personal experiences and ideas, because I don't like my postings causing any quarrels in the group.*" We expect a positive association between perceived member receptivity and the two mediators (i.e., satisfaction and community identification), in line with Deci and Ryan's (1980) argument that a person has a fundamental need to believe his or her activities are self-chosen, -governed, and -endorsed in relationship exchange processes. When a person perceives freedom from pressures to behave in certain ways and can express him- or herself as he or she wishes, the psychological distance between the self and others decreases (Deci et al., 1989).

In most text-based virtual communities, evolving openness, inclusiveness, and rapport can signal the community's member-centric orientation; members then experience their participation as an expression of the self, which should foster a positive atmosphere and enable relationships to develop (Smith and Barclay, 1997). However, the lack of verbal nuances and non-verbal cues in virtual communities sharply reduces the relationship-building cues present in physical contexts (Wellman et al., 1996), which leads members to consider other indicators of relationship exchange benefits, such as member receptivity (Rothaermel and Sugiyama, 2001). Research on organizational behavior (e.g., Deci et al., 1989) also shows that support for team members' autonomy, rather than control, leads to more positive relationship outcomes. In an online context, members' perceptions of others' listening behaviors should produce more favorable appraisals of group engagement and facilitate relationship investments (van Dolen et al., 2007). Accordingly,

**H3.** Member receptivity positively influences members' (a) overall satisfaction and (b) identification with the virtual community.

### 2.2.2. Member involvement

Virtual community researchers consider member involvement, a social community characteristic, critical to a

community's successful functioning (Fisher et al., 2002; McMillan and Chavis, 1986). Member involvement reveals the extent to which members perceive existing participants as engaged in the interaction, which creates a sense of presence (Burgoon et al., 1999/2000). Greater member involvement may convey that fellow members have invested time, effort, and other irrecoverable resources in the relationship. Thus, perceived member involvement should contribute significantly to a member's assessment of fellow members' benevolent orientations toward him or her.

The interviewed members described their expectations of some kind of response when posting messages on a community bulletin board and that a sufficient amount of engagement in the community increased their satisfaction with community participation. Greater member involvement reflects a central belief that fellow members will respond by engaging intensively in a conversation and provides assurance that aid will be available when needed (Burgoon and Hale, 1987; Burgoon et al., 1999/2000; Ridings et al., 2002; Rothaermel and Sugiyama, 2001). In a study of virtual community interaction, Chan and Li (2010) suggest that perceived member involvement creates psychological ties that motivate parties to maintain the relationship, as well as expectations of reciprocation. Ridings et al. (2002) likewise suggest that "greater responsiveness from others would indicate a willingness to help other community members and also increases the reciprocal nature of the community itself" (p. 277). This discussion implies then that member involvement produces more favorable appraisals of community engagement and facilitates a stronger identification with the community, which leads to the next hypothesis:

**H4.** Member involvement positively influences members' (a) overall satisfaction and (b) identification with the virtual community.

### 2.2.3. Enjoyment

Enjoyment, which is a hedonic characteristic and similar to the emotional response of pleasure, as described by environmental psychology, influences virtual community members' participation decisions (Cheung and Lee, 2009; Novak et al., 2000). For example, research into affective processing mechanisms suggests that emotions related to consumption leave strong affective traces or markers in episodic memory (Westbrook and Oliver, 1991). These memory elements are highly accessible during cognitive operations. Members draw on affective traces to evaluate community participation experiences and integrate them into proactive participation decisions. Cheung and Lee (2009) adopt a uses-and-gratifications paradigm to examine factors that influence satisfaction with the use of a virtual community; the hedonic benefits of prior group engagement have direct and positive effects on overall satisfaction. Consequently, enjoyable participation should influence a member's overall satisfaction.

The hedonic benefits of prior community participation also facilitate the development of attachment and belonging to the community (Nambisan and Baron, 2009). Ahearne et al. (2005) argue that identification is likely only if the individual member finds the community attractive, so the degree of identification varies with the perceptions of enjoyment levels. One interviewee noted, “*Engaging in certain community activities is very exciting and enjoyable. For example, when I send a virtual gift, forward a funny animation, or leave a message to other members in the community, I do feel it’s like entertainment. I truly enjoy the timely conversations with those like-minded others. It is the place where is full of joy! I like to visit the community as a relaxation during the break time. Also, by sharing those interesting pictures or stories, having fun together, members are close to each other. I do feel this community is like a second family to me.*” Research on community behavior likewise finds that members’ integration in a community is a function of their pleasurable participation experiences (Rothaermel and Sugiyama, 2001).

**H5.** Enjoyment positively influences members’ (a) overall satisfaction and (b) identification with the virtual community.

#### 2.2.4. Informativeness

Informativeness, which is a utilitarian community characteristic, refers to the degree to which a community offers information that members perceive as useful (Pavlou et al., 2007). This perceptual construct differs from the objective levels of information available and captures whether members perceive the information as accurate, relevant, and credible (Chakraborty et al., 2002; Pavlou et al., 2007). When a virtual community offers an important source of information in support of members’ decision making or task accomplishment, the valuable offer has important implications for the member–community relationship (Wellman and Gulia, 1999). Virtual community research indicates that a member’s perception of a community’s informativeness precedes and contributes to his or her relationship satisfaction with the community (e.g., Preece and Shneiderman, 2009). In addition, several studies posit that informativeness leads to community identification. For example, Dholakia et al. (2004) suggest that when members consider the information they gain useful, they feel more attached to a virtual community. Wasko and Faraj (2000) find in a content analysis that when members receive valuable information from their communities, they reciprocate by demonstrating identification with the community.

**H6.** Informativeness positively influences members’ (a) overall satisfaction and (b) identification with the virtual community.

#### 2.3. Moderating variable: recognition of contributions

Informal, private forms of appreciation include few members and provide primarily personal rewards; public recognition instead communicates group respect for members who

proactively undertake desired behaviors (Gruen et al., 2000). In shopping contexts, the benefits offered in return for contributions may include lower prices or customized offers that suit contributors’ specific desires and needs (Sheth and Parvatiyar, 1995). In a virtual community, a member who contributes information remains relatively anonymous, so recognition makes a contribution visible and generates favorable social consequences (e.g., status or prestige) (Fisher and Ackerman, 1998; Gruen et al., 2000). By enhancing such social benefits, the members assume that their engagements have been perceived as meaningful (Fisher and Ackerman, 1998), which in turn facilitates the transformation of satisfaction and identification into proactive participation behavior.

Social exchange theory also addresses this issue by arguing that parties enter into and maintain relationships with the expectation that doing so will be rewarding (Blau, 1964; Homans, 1958). For example, Blau (1964, p. 6) suggests that social exchange is an ongoing reciprocal process in which individual actions are “contingent on rewarding reactions from others.” Appropriate rewards then cause contributing members to feel a sense of obligation to the community; if they meet those obligations, members can maintain a positive self-image as people who repay debts and avoid the social stigma associated with violating the norm of reciprocity (Bagozzi, 1995). In addition, Durcikova and Gray (2009) argue that the consequences that result from a member contributing to a virtual community may affect the likelihood that he or she will invest energy in the community in the future. In contrast, a lack of proper recognition for members who perform proactive participation behavior may produce “extinction” (Michener and DeLameter, 1999). From a contributor’s perspective, this behavioral decision is rational, because contributing information or other resources involves considerable effort (Kang et al., 2007; Wiertz and de Ruyter, 2007). The potential for wasted effort likely deters members from proactively participating (Durcikova and Gray, 2009). Therefore, members who perceive a lack of community recognition for their contributions may exhibit relatively weaker linkages from satisfaction and identification to proactive participation behavior.

**H7.** The impact of (a) satisfaction and (b) identification on members’ proactive participation is stronger for those who believe that the community recognizes their contributions than for those who do not.

#### 2.4. Control variables

In addition to antecedents of proactive participation behavior, this study controls for community external prestige, because prior literature shows that external prestige affects members’ group participation behavior (Bergami and Bagozzi, 2000). Members’ pride develops from participating in a virtual community that they perceive as socially valuable (Dutton et al., 1994). Further controls pertain to two demographic variables: members’ ages and past participation behavior, as the conceptual framework in Fig. 1 shows.

### 3. Research methods

We collected the study data using three methods: in-depth interviews with a small group of community members (see Section 2.2 and Table A1), surveys of a wider group of community members, and archival data.

#### 3.1. Quantitative data collection

The data for this study were collected from members of travel and gourmet virtual communities, located on a well-known virtual community platform in Taiwan. Most of the registered members lived in Hong Kong, Singapore, Taiwan, and Mainland China. As in any voluntary social organization, the members vary in their level of participation behavior and their identification (Tsai and Pai, 2012). To enter the Web site and become a member, a user must register by choosing a user name and password. Most members shared their experiences about travel and gourmet foods. In an interview, the platform provider indicated that some businesses (e.g., travel agencies, restaurants) visited the communities to collect new product and product improvement ideas. External vendors also offered vouchers to community members (sometimes through the community platform) to encourage them to test a newly created dish or travel packages.

The questionnaire survey was administered through a Web-based system available through the community platform provider. The platform provider randomly selected the sample from the membership lists and forwarded e-mails (with a hyperlink to the Web survey) to encourage members to participate. The online version of the questionnaire was sent to 2588 members. To encourage the respondents to complete the questionnaire, we provided each of them with a shopping voucher valued at NTD200 (approximately USD7). After deleting 45 incomplete responses, the sample consisted of 635 participants, for a 24.5% response rate (635/2588), comparable to previous online consumer surveys (e.g., Koufaris, 2002; Pavlou, 2003). Table 1 outlines their demographic profiles.

#### 3.2. Archival data

The community platform provider had a database that accumulated data related to the number of articles a member created, the number of photos a member uploaded, the number of virtual gifts a member sent to other members, and members' demographics. We retrieved data about proactive participation with members' consent and coded them immediately after the survey data collection. These data thus offer an objective view of members' proactive participation behavior.

#### 3.3. Measures

Table 2 contains a detailed summary of the multiple-item measurement scales. The English-language questionnaire was translated into Chinese by a Taiwanese marketing professor.

Table 1  
Respondent demographic information (N=635).

Gender	
Male	269 (42.4%)
Female	366 (57.6%)
Age	
< 20	95 (15%)
20–24	129 (20.3%)
25–29	147 (23.1%)
30–34	123 (19.4%)
35–39	70 (11%)
40–45	44 (6.9%)
> 45	27 (4.3%)
Education	
High school or below	127 (20%)
College (2 years)	107 (16.9%)
University	329 (51.8%)
Graduate school or above	72 (11.3%)

Two doctoral students then independently translated the questionnaire back into English to verify its accuracy. On the basis of comparisons of the original and back-translated versions for semantic equivalence, two bilingual English–Chinese speakers refined the survey.

#### 3.3.1. Proactive participation behavior

In accordance with previous research and the findings of our in-depth interviews, we measured proactive participation behavior with four items,<sup>1</sup> gathered from the archived data for a one-month study period: (1) total number of articles created for the community, (2) total number of photos shared, (3) total number of virtual gifts sent to other members, and (4) total number of short messages sent to other members. In our qualitative research, we asked participants to indicate which members' behaviors benefited virtual communities and their long-term viability. As one participant revealed, "*I did appreciate some members who regularly contribute articles or photos to the community when I was a community cultivator. These articles or photos are invaluable assets for us. They not only help recruit new members but also retain our members. Others who tagged these articles or photos with a brief comment are also important for the community's viability, such as 'excellent' or 'wow! You are my hero!' If a virtual community fails to encourage the behaviors, it becomes a ghost town.*" Another participant noted, "*I will always remember the surprising birthday gift I got last year. Two of*

<sup>1</sup>We conducted correlation tests for the four items. The completely standardized results for the factor intercorrelations reveal that sent gifts correlate at 0.36 with uploaded photos; sent gifts also correlate with created articles (0.68) and sent short messages (0.64). Uploaded photos correlate with created articles (0.45) and sent short messages (0.38); created articles correlate with sent short messages (0.75). Overall, the correlations between these items are high. However, because these items are not reflective measurements, we cannot calculate the respective construct's internal consistency (e.g., composite reliability and average variance extracted). We thank the associate editor for pointing out this issue and helping us realize the nature of formative and reflective measurement.

Table 2  
Summary of measures.

Construct	Measures	Standardized Factor Loading <sup>a</sup>
<b>Proactive participation behavior</b>	(1) Total number of articles created for the community during the one-month study	
	(2) Total number of photos shared during the one-month study	
	(3) Total number of virtual gifts sent to other members during the one-month study	
	(4) Total number of short messages sent to other members during the one-month study	
<b>Member receptivity</b> CR <sup>b</sup> =0.83, AVE <sup>c</sup> =0.62	(1) The community members are willing to listen to me	0.78
	(2) The community members are unresponsive to my ideas. (R) <sup>d</sup>	0.91
	(3) The community members are open to my ideas	0.65
<b>Member involvement</b> CR=0.85, AVE=0.65	(1) The community seemed to find the conversation stimulating	0.79
	(2) The community showed enthusiasm while talking	0.80
	(3) The community was intensively involved in our conversation	0.82
<b>Enjoyment</b> CR=0.86, AVE=0.68	(1) I find participating in this community interesting	0.91
	(2) I find participating in this community enjoyable	0.87
	(3) I find participating in this community fun	0.68
<b>Informativeness</b> CR=0.94, AVE=0.83	(1) The information provided by this community is useful	0.96
	(2) The information provided by this community is valuable	0.91
	(3) This community is a very good source of information	0.86
<b>Satisfaction</b> CR=0.86, AVE=0.67	(1) Based on all my participation experience, I am satisfied with this virtual community	0.85
	(2) I am satisfied with my decision to participate in this virtual community	0.81
	(3) In general, this is a good virtual community to participate in	0.80
<b>Identification</b> CR=0.84, AVE=0.57	(1) I am very attached to the community	0.84
	(2) Other community members and I share the same objectives	0.78
	(3) If community members planned something, I'd think of it as something "we" would do rather than something "they" would do	0.66
	(4) I see myself as a part of the community	0.73
<b>Community prestige</b> CR= 0.94, AVE= 0.84	People generally regard your community as ...	
	(1) Well-known	0.90
	(2) Respected	0.94
	(3) Prestigious	0.91
<b>Recognition of contributions</b> CR=0.73, AVE=0.58	(1) The community provides proper rewards to active members for their efforts	0.80
	(2) The community shows its appreciation to those who contribute information	0.72

<sup>a</sup>All factor loadings are significant at  $p < 0.001$ .

<sup>b</sup>Composite reliability.

<sup>c</sup>Average variance extracted.

<sup>d</sup>Reverse-coded item.

my friends in the virtual community made a 'virtual cake' on my page with a note saying 'Happy Birthday to my dear friend!' It was so touching, although the cake couldn't be tasted. I was truly happy and moved! In addition, lots of participants in the virtual community also sent me with their warm wishes, no matter we were acquaintances or strangers. They were so welcoming and we were just like a family to celebrate the birthday for several days. I deeply felt that I was beloved through this virtual community." These comments indicate that sending gifts and encouraging members are both behaviors that provide viability and further growth opportunities to the community.

From a theoretical perspective, our conceptualization and measurement of proactive participation are consistent with Preece and Shneiderman's (2009) conceptualization of different forms of social participation in technology-mediated environments. For example, relatively passive participation behaviors include venturing in, reading, browsing, searching, or returning. Such behaviors do not take much effort or require members to expose themselves. Furthermore, Preece and Shneiderman (2009) propose proactive participation behaviors (e.g., posting, uploading, promoting participation) that differ from passive participation behaviors in that they feature discretionary efforts to initiate and enact the positive development of the community.

To measure proactive participation behavior but also reduce skewness, we followed Tabachnick and Fidell's (2001) suggestions to use a logarithmic transformation of the number of articles, photos, virtual gifts, and short messages, then averaged them to form a single indicator of proactive participation behavior for the structural equation model.

### 3.3.2. Other measures

The measures of the antecedents of satisfaction and identification were as follows: *member receptivity* and *member involvement* each featured separate, three-item scales adapted from van Dolen et al. (2007). *Enjoyment* was a three-item scale from Koufaris (2002). *Informative-ness* relied on a three-item scale adapted from Chen and Wells (1999). The mediators included the four-item scale from Algesheimer et al. (2005) to measure *identification* and a three-item scale from van Dolen et al. (2007) to measure *satisfaction*. The moderator, *recognition of contributions*, involved a three-item scale adapted from Gruen et al. (2000). Finally, the *community prestige* control variable was a three-item scale adapted from Bergami and Bagozzi (2000), and direct measures gathered members' ages and past behaviors, which may affect their proactive participation behaviors (Rothaermel and Sugiyama, 2001).

## 4. Results

Following Anderson and Gerbing (1988), this study adopted a two-step approach to test the models. First, a confirmatory factor analysis (CFA) assessed the measurement properties of the reflective latent constructs. Second, a structural equation analysis tested the research hypotheses.

All models used the LISREL 8.54 program (Jöreskog and Sörbom, 1999). To assess the goodness of fit, this study employed chi-square tests, the root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), non-normed fit index (NNFI), and comparative fit index (CFI) (Hu and Bentler, 1999; Marsh et al., 1996). Satisfactory model fit required nonsignificant chi-square tests, SRMR and RMSEA values less than or equal to 0.08, and NNFI and CFI greater than or equal to 0.90.

### 4.1. Measurement model evaluation

#### 4.1.1. Internal consistency

Two measures evaluated the internal consistency of constructs: composite reliability (CR) and average variance extracted (AVE). The CR is analogous to coefficient  $\alpha$ , whereas AVE estimates the amount of variance captured by a construct's measure, relative to random measurement error (Fornell and Larcker, 1981). Estimates of CR greater than 0.60 and AVE greater than 0.50 support internal consistency (Bagozzi and Yi, 1998). As Table 2 shows, the CRs range from 0.73 to 0.94, and the AVEs range from 0.57 to 0.84. Therefore, all constructs exhibit good internal consistency.

#### 4.1.2. Discriminant validity

Discriminant validity is the extent to which an item does not relate to measures of other constructs. We assess the discriminant validity of the measures with three approaches. First, the results of a CFA model with 11 latent constructs and 27 measures revealed that the model fit the data well. The goodness-of-fit statistics for the model were as follows:  $\chi^2(272)=987.35$ ,  $p \approx 0.00$ , RMSEA=0.064, SRMR=0.038, NNFI=0.96, and CFI=0.97. None of the 95% confidence intervals for each correlation coefficient included the value of 1, which provided strong evidence of discriminant validity. Second, according to Table 3, the diagonal elements (square roots of the AVE for each construct) were greater than the off-diagonal elements, so each construct shared more variance with its measures than with other constructs (Fornell and Larcker, 1981). Thus, all the measures of the constructs in the measurement model achieved discriminant validity. Third, this study examined the discriminant validity of the measures using chi-square difference tests, in which the correlations of all possible pairs of constructs first were freely estimated and then constrained to equal 1. The results revealed that the factor pairs were distinct, in support of discriminant validity (see Table B1). Given some of the higher correlations among constructs, we assessed multicollinearity and confirmed that the variance inflation factor values for all of the constructs were acceptable (between 1.55 and 1.98).

### 4.2. Structural model evaluation

The overall fit statistics indicate that the hypothesized model offers a good representation of structures that underlie the observed data ( $\chi^2[242]=961.27$ ,  $p \approx 0.00$ , RMSEA=0.068, SRMR=0.051, NNFI=0.96, CFI=0.97). Specifically,



Table 3  
Correlation matrix and summary statistics.

Variable	Correlation <sup>a</sup>											
	1	2	3	4	5	6	7	8	9	10	11	
1. Proactive participation behavior	–											
2. Identification	0.30	<b>0.75<sup>b</sup></b>										
3. Satisfaction	0.22	0.67	<b>0.82</b>									
4. Informativeness	0.16	0.44	0.44	<b>0.91</b>								
5. Enjoyment	0.18	0.53	0.63	0.55	<b>0.82</b>							
6. Member receptivity	0.12	0.43	0.49	0.29	0.50	<b>0.79</b>						
7. Member involvement	0.13	0.50	0.60	0.48	0.72	0.55	<b>0.81</b>					
8. Community prestige	0.09	0.37	0.40	0.41	0.48	0.36	0.44	<b>0.92</b>				
9. Past behavior	0.23	0.09	–0.01	–0.01	–0.03	0.01	0.00	–0.02	–			
10. Age	0.14	0.03	0.02	0.00	–0.11	–0.02	–0.06	0.00	0.08	–		
11. Recognition of contributions	0.02	0.5	0.71	0.49	0.62	0.43	0.65	0.41	–0.07	–0.03	<b>0.76</b>	
<b>Mean</b>	52.55	4.96	5.67	5.35	6.08	5.73	5.93	5.01	67.23	28.73	5.75	
<b>Standard Deviation</b>	260.16	0.97	0.96	1.09	0.89	0.98	0.98	1.06	151.57	9.20	1.06	

<sup>a</sup>All correlations are significantly less than 1.00.

<sup>b</sup>Figures on the diagonal are the square roots of the AVE score for each construct.

the results suggest a positive, direct relationship between satisfaction and proactive participation behavior ( $\beta=0.10$ ,  $p < 0.05$ ), in support of H1. Likewise, community identification has a positive and significant effect on members' proactive contribution behavior ( $\beta=0.22$ ,  $p < 0.05$ ), in support of H2. With regard to the antecedents, positive, significant relationships emerge between member receptivity and satisfaction ( $\gamma=0.16$ ,  $p < 0.001$ ) and between member receptivity and identification ( $\gamma=0.15$ ,  $p < 0.001$ ), in support of H3a and H3b. The results also indicate a positive and significant main effect of member involvement on satisfaction ( $\gamma=0.25$ ,  $p < 0.01$ ) and identification ( $\gamma=0.34$ ,  $p < 0.001$ ), in support of H4a and H4b. The positive and significant main effects of enjoyment on satisfaction ( $\gamma=0.17$ ,  $p < 0.01$ ) and identification ( $\gamma=0.25$ ,  $p < 0.001$ ) support H5a and H5b, respectively. The significantly positive effects of informativeness on satisfaction ( $\gamma=0.18$ ,  $p < 0.001$ ) and identification ( $\gamma=0.09$ ,  $p < 0.05$ ) support H6a and H6b.

### 4.3. Tests of mediation and rival hypotheses

To confirm the model's validity, this study performed four formal tests of mediation on the paths from the antecedents of both identification and satisfaction to proactive participation behaviors. This step reveals whether additional direct paths, not specified in the model, are significant. For example, the comparison of the proposed model (Fig. 1) with a model that contained an additional path from member receptivity to proactive participation revealed that the difference in the chi-square values of the two models ( $\Delta\chi^2=0.5$ ), with one degree of freedom, was not significant ( $p > 0.47$ ). That is, satisfaction and identification fully mediated the effect of member receptivity on members' proactive participation behaviors. Table 4 summarizes the results of all four mediation tests; the direct effects are all insignificant, in support of the robustness of the proposed model.

### 4.4. Moderating influences of recognition of contributions

Multiple-group analyses (Jöreskog and Sörbom, 1999) serve to test the hypotheses pertaining to the moderating effects. Participants constitute separate groups, based on a median split of their composite scores on the two-item recognition of contributions scale (Gruen et al., 2000): (1) the community provides proper rewards to active members for their efforts, and (2) the community shows its appreciation to those who contribute information (seven-point interval scales, strongly agree to strongly disagree).

The test of H7a and H7b demanded separate structural models for the two subsamples, with moderation tests designed to identify any differences in the respective coefficients of the hypothesized paths. For example, for H7a in the first (i.e., baseline) model, the effect of satisfaction on members' proactive participation behavior could vary across groups; in the second, this effect remained equal across subsamples. If the model with the

Table 4  
Mediation tests.

Model	Added path	Goodness-of-fit	Tests of hypotheses
$M_0$	Baseline model: hypothesized paths	$\chi^2(242)=961.27$ , $p \cong 0.00$ , RMSEA=0.068, SRMR=0.051, NNFI=0.96, CFI=0.97.	–
$M_1$	Member receptivity → Proactive participation behavior	$\chi^2(241)=960.77$	$M_0-M_1:\chi^2_d(1)=0.50$ , $p > 0.47$
$M_2$	Member involvement → Proactive participation behavior	$\chi^2(241)=961.00$	$M_0-M_2:\chi^2_d(1)=0.27$ , $p > 0.60$
$M_3$	Enjoyment → Proactive participation behavior	$\chi^2(241)=960.06$	$M_0-M_3:\chi^2_d(1)=1.21$ , $p > 0.27$
$M_4$	Informativeness → Proactive participation behavior	$\chi^2(241)=960.83$	$M_0-M_4:\chi^2_d(1)=0.44$ , $p > 0.50$

Table 5  
Results for moderating effects.

Main effects	High value of public recognition ( $N=325$ )	Low Value of public recognition ( $N=310$ )	Chi-square difference, ( $\Delta\chi^2=1$ )
Satisfaction → Proactive participation behavior	0.08 ( $t=1.02$ )	0.09 ( $t=1.56$ )	0.41 <sup>a</sup>
identification → Proactive participation behavior	0.30 <sup>**</sup> ( $t=4.7$ )	0.13 <sup>*</sup> ( $t=2.07$ )	9.06 <sup>b</sup>

<sup>a</sup>H7a is not supported (change is in opposite direction but insignificant).

<sup>b</sup>H7b is supported (change is in hypothesized direction and significant).

\* $p < 0.05$ .

\*\* $p < 0.01$ .

equality constraint fits the data significantly worse than the baseline model, the moderator variable must influence the relationships under consideration.

Table 5 summarizes the results of the moderation analysis. In contrast with the predicted strength of the path from satisfaction to proactive participation behavior, the link is weaker for high recognition members than for those who indicate low recognition of contributions, though the paths are not significant for either group ( $\Delta\chi^2=0.41$ ,  $\Delta df=1$ ,  $p > 0.5$ ). Thus, H7a is not supported. In contrast, the moderating effects of recognition on the link from identification to members' proactive participation behaviors match the relevant hypothesis: the path from identification to members' proactive participation behavior differs significantly across the low versus high recognition groups ( $\Delta\chi^2=9.06$ ,  $\Delta df=1$ ,  $p < 0.05$ ), in support of H7b.

#### 4.5. Results of common method bias

Although we believe that common method bias is unlikely to be an issue in our study, because we used multiple measurement sources and a longitudinal design, we examined the robustness of the results with three approaches. First, as Podsakoff et al. (2003) and Bagozzi (2011) recommend, we employed Harmon's one-factor test. This test assesses the

threat of common method bias by indicating whether a single factor offers a viable alternative explanation of the analysis. The one-factor latent model yielded a chi-square of 5169.25 ( $df=209$ ), significantly worse than the fit of the measurement model. Therefore, we gained preliminary evidence that the measurement model was robust to common method variance. Second, noting the possible limitations of Harman's one-factor test, we also employed Lindell and Whitney's (2001) marker variable assessment technique (see Table 6). We chose switching costs (SC) as the marker variable for the analysis, because it is theoretically unrelated to our dependent variable of satisfaction (or identification). The switching cost and satisfaction measures exhibited nonsignificant correlations of 0.09. Therefore, we used SC's measured correlation with the dependent variable as an indication of method variance. As shown in Table 6, none of the significant correlations in the overall model became insignificant after adjustment, providing additional evidence that common method bias was not a concern in our data. Third, common method bias was unlikely to explain the hypothesized moderating effect of recognition of contribution level on the link between identification and proactive participation behavior, because the respondents should not have anticipated any complicated relationships in the framework (Aiken and West, 1991). Collectively, we thus conclude that common method bias does not present a significant threat to the study.

Table 6  
Lindell and Whitney's (2001) marker variable technique results.

Constructs	INV	ENJ	REC	INF	PRE	RECOG	ID	SAT
ENJ	0.55 0.51 0.49							
REC	0.29 0.22 0.20	0.50 0.45 0.44						
INF	0.48 0.43 0.42	0.72 0.69 0.68	0.55 0.51 0.49					
PRE	0.41 0.35 0.34	0.48 0.43 0.42	0.36 0.30 0.28	0.44 0.38 0.37				
RECOG	0.48 0.43 0.42	0.62 0.58 0.57	0.43 0.37 0.36	0.66 0.63 0.62	0.41 0.35 0.34			
ID	0.44 0.38 0.37	0.53 0.48 0.47	0.43 0.37 0.35	0.50 0.45 0.44	0.37 0.31 0.29	0.50 0.45 0.44		
SAT	0.44 0.38 0.36	0.63 0.59 0.58	0.49 0.44 0.43	0.60 0.56 0.55	0.40 0.34 0.33	0.70 0.67 0.66	0.67 0.64 0.63	
SC	0.09 0.01 -0.02	0.11 0.02 0.00	0.03 -0.06 -0.09	0.08 -0.01 -0.03	0.02 -0.08 -0.10	0.00 -0.09 -0.12	0.14 0.05 0.03	0.09 <sup>a</sup>

Notes: The first value in each cell is the correlation between the constructs, the second value is the correlation corrected for method bias, and the third value is the correlation value for a 95% sensitivity analysis. INV=member involvement, ENJ=enjoyment, REC=member receptivity, INF=informativeness, PRE=community prestige, RECOG=recognition of contributions, ID=identification, SAT=satisfaction, SC=switching costs.

<sup>a</sup>This is a marker correlation.

## 5. Discussion and conclusion

The current research extends previous studies of virtual communities by proposing and testing a model of members' proactive participation behavior. Our findings, based on both self-reported and objective behavioral data, reveal that social, hedonic, and utilitarian community characteristics significantly influence proactive participation through identification and satisfaction. This study also shows that the conversion of community identification into participation behavior depends on the recognition of contributions. We discuss each of these results in turn, along with their implications, and suggest some directions for further research.

### 5.1. Implications for research

First, this study advances current understanding of the antecedents of members' proactive participation behavior in virtual communities. From our literature review and interviews with community members, we identified several community characteristics (i.e., social, hedonic, and utilitarian) that influence proactive participation. Of the factors we examined, member involvement plays a relatively more important role in triggering proactive participation than the other factors. From a participant's

perspective, fellow members' responsiveness constitutes a representation of relationship investments in the virtual community, and as a consequence, a psychological tie is likely to arise that leads to an expectation of reciprocation (de Wulf et al., 2001). This finding provides some support for the argument that minimal interactions or a sense of group indifference lead participants to doubt the potential for participation benefits, which inhibits their further proactive participation (Durcikova and Gray, 2009).

Second, our findings indicate that member receptivity leads to more favorable assessments of the community, which enables the progression of members' relationships with that community. This result might be caused by the signal of member-centric orientation, sent by the atmosphere of community openness, which encourages members' commitment to the community (e.g., Jang et al., 2008). Moreover, we find that enjoyment provides a key antecedent of proactive participation. Virtual communities often involve not just education or work but also social support or leisure, which suggests that entertaining features should be addressed in behavioral models as a means to understand members' evaluative judgments of community engagement (e.g., Cheung and Lee, 2009). Further research that considers how to encourage hedonically rewarding experiences would be valuable.

Third, this study contributes to virtual community research that has considered only direct effects by investigating both social and psychological mediating processes underlying the relationships between distal antecedents (social, hedonic, and utilitarian community characteristics) and proactive participation behavior. Dholakia et al. (2004) and Jang et al. (2008) find that community characteristics elicit members' identification with the community, which drives them to undertake altruistic rather than self-interested tasks. These studies predominately focus on social identification mediating processes. To complement existing conceptual approaches and focus more explicitly on the role of social and psychological mediating mechanisms (i.e., social identification and satisfaction), we investigate dual mediating mechanisms underlying community attributes and proactive participation behavior. We find strong support for the proposition that in addition to the conventional, identification-based process, satisfaction offers an important psychological mediating mechanism in the relationship between community characteristics and proactive participation behavior. The relevance of these findings is especially high, because the results are based on a large-scale, multi-source data set (self-reported and objective behavioral data).

Fourth, our findings regarding mediating processes extend Lin's (2008) and Cheung and Lee's (2009) research by demonstrating that community characteristics affect various relationship outcomes through *distinct* mediating processes. For example, Lin (2008) finds that satisfaction, rather than community identification, is the most significant mediating variable for explaining members' loyalty to virtual communities. Cheung and Lee (2009) report that when compared with social influence mediating variables, satisfaction is the most critical mediator of the effect of distal antecedents on decisions to continue using relatively passive forms of participation. In contrast with the proactive participation examined here, members' identification becomes the most important mediating mechanism, because such behavior is more effortful (Preece and Shneiderman, 2009).

Fifth, this study investigates the moderating influence of recognition of contributions in proactive participation decision processes. The findings indicate that public recognition moderates the identification–proactive participation relationship, such that the positive link is stronger for members who perceive that they have been properly treated or rewarded by the virtual community than among those who do not. This significant moderating effect has important implications for both social identification and group participation research (e.g., Ahearne et al., 2005; Bergami and Bagozzi, 2000; Bhattacharya and Sen, 2003; Gruen et al., 2000; Hsu et al., 2007). Both perspectives assume that those who identify with the group make reasonable efforts to follow through on a sense of belongingness. However, not everyone is equally likely to do so. From a member's perspective, public recognition represents a type of reward for a contributor and an

unambiguous valuation of the member's contribution, which significantly increases the perceived meaningfulness of such behavior (Gruen et al., 2000; Hsu et al., 2007). This finding extends social identification research (Ahearne et al., 2005; Bergami and Bagozzi, 2000; Bhattacharya and Sen, 2003) by empirically investigating the moderating role of recognition as it transforms identification into proactive participation behavior. It also extends membership management literature by explaining why members with high identification may have limited engagement with the social group (Ahearne et al., 2005; Gruen et al., 2000).

However, recognition of contributions does not moderate the effects of satisfaction on member contribution behaviors. A post hoc analysis (quantile regression) suggests that the effects of satisfaction on proactive participation behavior are asymmetric: satisfaction exerts a greater impact on members in the bottom and upper quantiles but a lesser effect in the middle quantiles. This asymmetric effect may buffer the stronger moderating effects of recognition on the link from satisfaction to participation behavior. This research challenge merits further investigation.

## 5.2. Implications for practitioners

These new insights into members' proactive participation decisions offer useful guidance for managers. Our results indicate that social factors involving people (i.e., member receptivity and involvement) are as important as the factors involving utilitarian and hedonic participation value. Without "people" factors, even the most enthusiastic participants eventually may dismiss the potential benefits of proactive participation if they fail to find others with similar levels of enthusiasm. Therefore, this study has several suggestions for practice.

First, according to the qualitative data, a major reason community members do not proactively contribute information is their fear of being perceived negatively by others. Findings from this study suggest that evolving receptivity could signal that the community has a member-centric orientation, and members experience their participation as an expression of the self, which should produce more favorable appraisals of their community engagement. For members who are relatively junior, the community's receptivity could appear remote or irrelevant. Therefore, the community manager should work to design effective exemplar and mentoring mechanisms. For example, senior members can serve as role models for novice members, selected on the basis of their openness and inclusiveness. These role models should be exemplars, not merely coaches. The community manager can also explicitly incorporate "respect for others' opinions" into the participation policies.

Second, member involvement influences proactive participation behavior. One participant commented, "People like to know someone is reading and responding the messages

they posted, even if all they do is just read.” Thus, community interface designers need to create and maintain an infrastructure that encourages dialog and collaboration among members. Specifically, they should add mechanisms for two-way communication, make it easy for participants to contact one another, and actively respond to actions from other participants. They could further encourage discourse by planting conversations and provocative ideas. Moreover, community cultivators should act with transparency, close the member feedback loop, and communicate to members.

Third, members’ participation experience needs to feel like entertainment, because hedonistic rewards are critical for encouraging proactive participation. The qualitative data show that enjoyment can spur interest in community activities, mentioned frequently in relation to individual creativity, as one participant explained: “*When I have enjoyed experiences during past community interactions—of course it encourages future participation and most importantly sparks new ideas to some questions.*” Community cultivators should attempt to raise the level of enjoyment that information contributors experience as they help others, perhaps by connecting the contributors and recipients to allow recipients to express their appreciation for the information received. The realization that fellow members have benefitted from their information contribution can increase feelings of altruism among information contributors (Davenport and Prusak, 1998). In building the infrastructure of their virtual communities, managers should be sure to leverage the representational richness of the medium to inspire and stimulate contributors. For example, animation effects in community interaction systems might improve participants’ experience by attracting attention and creating fun during the participation processes.

Fourth, community informativeness is an important influence on proactive participation. This direct relationship might arise because when members have benefited from rich content and accessible information, they feel obligated to reciprocate with proactive participation. These results confirm and explicate the role of useful information provision in contribution decision-making processes. As increasingly important sources of information, virtual communities that are more informative should create an obligation to reciprocate with more useful information. Thus, community cultivators should explore technological infrastructures and efficient software programs that can filter and monitor user-generated content online (Chan and Li, 2010). Moreover, the interface should include attributes such as a convenient information search engine, efficient means to post updates, a clear archive organization, and reliable levels of censorship. These central components of the virtual community help generate accurate, up-to-date, useful, and rich information resources for members and thus motivate them to engage in reciprocal interactions (Burgoon et al., 2002). The importance of community informativeness in the contribution process is consistent with other research (e.g., Chan

and Li, 2010) and reinforces the importance of accumulating useful information—critical to the sustainability of any virtual community.

Fifth, the transformation of identification into members’ proactive participation behaviors is contingent on the presence of extrinsic rewards. The community can influence the extent of the members’ perceptions of proper rewards by designing a rating scheme that provides incentives for credible ratings. Another alternative would be to design a system in which members can create and grant virtual gifts to members who contribute good information to the community. The community might hold a recognition ceremony to express publicly its appreciation for members’ efforts. Finally, managers might offer a point collection mechanism, encouraging users to collect as many points as possible by participating in the different dimensions of collaboration and expertise. The accumulated points could appear on public leader boards and above each individual space in the virtual communities. From a member’s perspective, these unambiguous signals of valuation should significantly increase the perceived meaningfulness of proactive participation behavior.

### 5.3. Limitations and suggestions for further research

Several limitations of this study offer avenues for additional research too. First, we focused on members of travel and gourmet food virtual communities; behaviors might differ in other settings (e.g., fantasy, firm-hosted commercial communities). In transaction-based virtual communities, extrinsic rewards or incentives might have a greater influence on the quality and quantity of contributions (Hagel and Armstrong, 1997). Second, our investigation of participation antecedents included only a limited number of constructs. Further studies should investigate whether and how other factors might influence proactive participation. For example, community leader support may create and foster a social climate of active participation (Koh et al., 2007). Third, this study measured proactive participation behavior in terms of four items from the archived data. Although our measurements of proactive participation behavior were consistent with those from previous research (e.g., Preece and Shneiderman, 2009; Wasko and Faraj, 2005; Wiertz and de Ruyter, 2007), we might have ignored some possible items; further research should address other possible measurements, such as proactive assistance in recruiting new members. Fourth, this study focused on a sample of members living Hong Kong, Singapore, Taiwan, and Mainland China; the proactive participation behavior findings might not hold in other contexts. Cross-country comparisons should include extrinsic reward systems too, because national culture influences behavior and has implications for group interaction behavior (Hofstede, 1980; Schwartz and Bardi, 2001; Triandis, 1995).

## Appendix A

See appendix Table A1.

Table A1  
Sample respondent comments, in support of selected participation factors.

Participation factors	Illustrative respondent comments
Informativeness	<p><i>I found the information in the community very useful for my trip planning. Members share their own travel diary, which usually includes detailed, updated, and accurate travel information. It is relatively inconvenient or haphazard to look up the information in tour books (due to relatively little information) or numerous websites (due to too much unrelated information). So I love to search and browse the relevant and detailed information in the community. Moreover, when such information sharing becomes very common in the community, I feel a social expectation to share my stories too, because I am one of group (John, M, 28, married, sales<sup>a</sup>).</i></p> <p><i>I viewed the community as a good reference for nice restaurants. The information is well-organized by areas, categories, and 'favorites' (based on ratings from members). Also a search engine is helpful when I only want to look up a specific restaurant. I always can quickly find the one I need. It is a very good source. Brilliant! I love it. That's a valuable and very satisfying experience. I benefited from it a lot. I hope I can give others the same sort of help that I received (Pauline, F, 31, single, teacher).</i></p>
Enjoyment	<p><i>When I send a virtual gift or leave a message to other members in the community, I do feel it's like entertainment. I truly enjoy the timely conversations with those like-minded others. We have similar interests, talk about related topics, and thus if any of us has problems, we will help each other to solve the problems together (Mike, M, 35, married, engineer).</i></p> <p><i>I love sharing my experiences with others who are also interested in gourmet. That's just fun to share the photos of delicious food, and see my friends' responses (e.g., asking about its taste, inviting me to go again). The conversations are full of joy. That's a kind of gratification to me (Grace, F, 17, single, students).</i></p> <p><i>I learned a lot from the members, especially when I traveled by myself. I love to explore new things (e.g., visiting unfamiliar places), and I find browsing the travel diaries of other members is an exploration to me. Such playfulness is gained even before I visit the same place. I will also share my travel diary after visiting, not only because writing my travel diary is fun but also because I find myself quite attached to the community, and thus I hope to do something good for our group (Alice, F, 21, single, student).</i></p>
Member receptivity	<p><i>I think members are open-minded about my opinions and experiences in the postings. Moreover, they are very supportive of me. Thus I feel I should support them by answering their questions to thank them for their kindness. I truly appreciate the network I built and cherish the friends I made in this community (Pauline, F, 31, single, teacher).</i></p> <p><i>I feel free to express my ideas here with the members, because I feel it's a very friendly environment for sharing different viewpoints. Everyone's comments are respected, as every member is fairly respectful. I believe such brainstorming helped us learn from each other. Thus I love to initiate new discussions about my recent thinking and get their feedback (George, M, 42, married, sales).</i></p> <p><i>Even though sometimes there are different voices in a group discussion, the members will respect the various views. There are no challenging conversations in the community. That is very important to me! If the members are not open-minded, not willing to listen to different ideas, I won't share my personal experiences and ideas, because I don't like my postings causing any quarrels in the group (Kate, F, 22, single, student).</i></p>
Member involvement	<p><i>I was very impressed by the members' high responsiveness in replying to questions. Each of my postings can easily lead to a group discussion. Then I not only reply but also contribute new thoughts to the community. Because of this engagement, I try to create possible conversations rather than just asking questions (Alice, F, 21, single, student).</i></p> <p><i>I found members help each other by answering questions in a very short time. For example, I asked a question and the solution appeared within 2 minutes. That's a form of members' benevolence, and in addition to thanking the replier, I felt strongly indebted to reciprocate this goodness. Thus from then on, I could empathize with others who are in a situation similar to mine, so I am happy to help as much as possible (Mike, M, 35, married, engineer).</i></p> <p><i>I feel most members are quite involved in the discussions, very passionate in sharing ideas about the related topics. In addition, the members usually show their appreciation in their request when they ask questions. They seem to expect the conversations to confirm or extend their ideas. So I feel I am deeply engaged, and I respond in a nice way too (Joyce, F, 50, married, homemaker).</i></p>
Recognition of contributions	<p><i>I was very proud when my articles are highlighted as one of the most popular postings on the frontpage, which can also attract more people to read my work. Being viewed as an expert not only gives me self-confidence but also makes me feel I have to provide better quality information (Mike, M, 35, married, engineer).</i></p> <p><i>I am happy when I receive positive feedback that recognizes my efforts, either from the members' direct replies or from the community's rating system. I start to feel that more and more people recognize me as an individual and as a 'friend.' I feel I am needed, because my words provide some value to others. It's a huge encouragement for me to keep writing my travel diary in the community (Kate, F, 22, single, student).</i></p> <p><i>I suppose if I found no 'recognition' for my replies to members' questions, I would feel that my postings were not useful or interesting to them. That would be quite disappointing to me and inhibit my willingness to contribute further (John, M, 28, married, sales).</i></p> <p><i>Initially, it seems I was talking to an anonymous, large group, but I found more and more people were 'tracking' my postings, as my audience. I feel good that I am identifiable and recognized, and the 'audience' was engaged by my sharing (Pauline, F, 31, single, teacher).</i></p> <p><i>Personally I feel I have gained much from the group myself, so I was happy to contribute something by helping in return. Interestingly, the more questions I answered for other members, the higher my ratings were. Then I felt I was more obligated to help others (George, M, 42, married, sales).</i></p>

<sup>a</sup>Each respondent's nickname, gender, age, marital status, and occupation appear after his or her quote.

Appendix B

See appendix Table B1.

Table B1  
 $\chi^2$  statistics for the discriminant validity of factor pairs.

	1	2	3	4	5	6	7	8
1. Proactive participation								
2. Identification	$\chi^2_d(1)=63.7^a$							
3. Satisfaction	$\chi^2_d(1)=42.73$	$\chi^2_d(1)=200.79$						
4. Informativeness	$\chi^2_d(1)=17.87$	$\chi^2_d(1)=101.05$	$\chi^2_d(1)=104.01$					
5. Enjoyment	$\chi^2_d(1)=27.44$	$\chi^2_d(1)=141.95$	$\chi^2_d(1)=203.76$	$\chi^2_d(1)=156.7$				
6. Member receptivity	$\chi^2_d(1)=152.82$	$\chi^2_d(1)=82.46$	$\chi^2_d(1)=110.27$	$\chi^2_d(1)=42.45$	$\chi^2_d(1)=115.09$			
7. Member involvement	$\chi^2_d(1)=13.95$	$\chi^2_d(1)=117.42$	$\chi^2_d(1)=172.71$	$\chi^2_d(1)=125.74$	$\chi^2_d(1)=269.33$	$\chi^2_d(1)=139.25$		
8. Community prestige	$\chi^2_d(1)=44.59$	$\chi^2_d(1)=79.39$	$\chi^2_d(1)=89.23$	$\chi^2_d(1)=93.67$	$\chi^2_d(1)=123.55$	$\chi^2_d(1)=59.68$	$\chi^2_d(1)=104.79$	
9. Public recognition	$\chi^2_d(1)=14.08$	$\chi^2_d(1)=87.02$	$\chi^2_d(1)=181.12$	$\chi^2_d(1)=107.97$	$\chi^2_d(1)=160.91$	$\chi^2_d(1)=74.26$	$\chi^2_d(1)=160.23$	$\chi^2_d(1)=70.42$

<sup>a</sup>The difference in the chi-square values of the two models (i.e., baseline and constrained models), with one degree of freedom.

References

Ahearne, M., Bhattacharya, C.B., Gruen, T., 2005. Antecedents and consequences of customer–company identification: expanding the role of relationship marketing. *Journal of Applied Psychology* 90 (3), 574–585.

Aiken, L.S., West, S.G., 1991. *Multiple Regression: Testing and Interpreting Interactions*. Sage, Newbury Park, CA.

Algesheimer, R., Dholakia, U.M., Herrmann, A., 2005. The social influence of brand community: evidence from European car clubs. *Journal of Marketing* 69 (3), 19–34.

Andersen, P.H., 2005. Relationship marketing and brand involvement of professionals through web-enhanced brand communities: the case of Coloplast. *Industrial Marketing Management* 34 (3), 285–297.

Anderson, J.C., Gerbing, D.W., 1988. Structural equation modeling in practice: a review and recommended two-step approach. *Psychological Bulletin* 103 (3), 411–423.

Ashforth, B.E., Mael, F., 1989. Social identity theory and the organization. *Academy of Management Review* 14 (1), 20–39.

Bagozzi, R.P., 1995. Reflections on relationship marketing in consumer markets. *Journal of the Academy of Marketing Science* 23 (4), 272–277.

Bagozzi, R.P., 2011. Measurement and meaning in information systems and organizational research: methodological and philosophical foundations. *MIS Quarterly* 35 (2), 261–292.

Bagozzi, R.P., Dholakia, U.M., 2006. Open source software user communities: a study of participation in Linux user groups. *Management Science* 52 (7), 1099–1115.

Bagozzi, R.P., Yi, Y., 1998. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science* 16 (1), 74–94.

Bateman, T.S., Organ, D.W., 1983. Job-satisfaction and the good soldier: the relationship between affect and employee citizenship. *Academy of Management Journal* 26 (4), 587–595.

Bergami, M., Bagozzi, R.P., 2000. Self-categorization, affective commitment and group self-esteem as distinct aspects of social identity in the organization. *British Journal of Social Psychology* 39 (4), 555–577.

Bhattacharya, C.B., Sen, S., 2003. Consumer–company identification: a framework for understanding consumers’ relationships with companies. *Journal of Marketing* 67 (2), 76–88.

Blau, P.M., 1964. *Exchange and Power in Social Life*. John Wiley & Sons, New York.

Bock, G., Zmud, R.W., Kim, Y., Lee, J., 2005. Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivators, social–psychological forces, and organizational climate. *MIS Quarterly* 29 (1), 87–111.

Burgoon, J.K., Bonito, J.A., Bengtsson, B., Cederberg, C., Lundeberg, M., Allspach, L., 2000. Interactivity in human–computer interaction: a study of credibility, understanding, and influence. *Computers in Human Behavior* 16 (6), 553–574.

Burgoon, J.K., Bonito, J.A., Bengtsson, B., Ramirez, A., Dunbar, N.E., Miczo, N., 1999/2000. Testing the interactivity model: communication processes, partner assessments, and the quality of collaborative work. *Journal of Management Information Systems* 16 (3), 33–56.

Burgoon, J.K., Bonito, J.A., Ramirez Jr., A., Dunbar, N.E., Kam, K., Fischer, J., 2002. Testing the interactivity principle: effects of mediation, propinquity, and verbal and nonverbal modalities in interpersonal interaction. *Journal of Communication* 52 (3), 657–677.

Burgoon, J.K., Hale, J.L., 1987. Validation and measurement of the fundamental themes of relational communication. *Communication Monographs* 54 (1), 19–41.

Chakraborty, G., Lala, V., Warren, D., 2002. An empirical investigation of antecedents of B2B websites’ effectiveness. *Journal of Interactive Marketing* 16 (4), 51–72.

Chan, K.W., Li, S.Y., 2010. Understanding consumer-to-consumer interactions in virtual communities: the salience of reciprocity. *Journal of Business Research* 63 (9–10), 1033–1040.

Chen, Q.M., Wells, W.D., 1999. Attitude toward the site. *Journal of Advertising Research* 39 (5), 27–37.

Cheung, C.M.K., Lee, M.K.O., 2009. Understanding the sustainability of a virtual community: model development and empirical test. *Journal of Information Science* 35 (3), 279–298.

Chiu, C.M., Hsu, M.H., Wang, E.T.G., 2006. Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories. *Decision Support Systems* 42 (3), 1872–1888.

Clark, M.S., Isen, A.M., 1982. Toward understanding the relationship between feeling states and social behavior. In: Hastorf, A., Isen, A.M. (Eds.), *Cognitive Social Psychology*. Elsevier, New York, pp. 73–108.

- Davenport, T., Prusak, L., 1998. *Working Knowledge*. Harvard Business School Press, Boston.
- de Wulf, K., Odekerken-Schroder, G., Iacobucci, D., 2001. Investments in consumer relationships: a cross-country and cross-industry exploration. *Journal of Marketing* 65 (4), 33–50.
- Deci, E.L., Connell, J.P., Ryan, R.M., 1989. Self-determination in a work organization. *Journal of Applied Psychology* 74 (4), 580–590.
- Deci, E.L., Ryan, R.M., 1980. The empirical exploration of intrinsic motivational processes. In: Berkowitz, L. (Ed.), *Advances in Experimental Social Psychology*, vol. 13. Academic Press, New York, pp. 39–80.
- Dholakia, U.M., Bagozzi, R.P., Pearo, L.K., 2004. A social influence model of consumer participation in network- and small-group-based virtual communities. *International Journal of Research in Marketing* 21 (3), 241–263.
- Dou, W., Krishnamurthy, S., 2007. Using brand websites to build brands online: a product versus service brand comparison. *Journal of Advertising Research* 47 (2), 193–206.
- Durcikova, A., Gray, P., 2009. How knowledge validation processes affect knowledge contribution. *Journal of Management Information Systems* 25 (4), 81–107.
- Dutton, J.E., Dukerich, J.M., Harquail, C.V., 1994. Organizational images and member identification. *Administrative Science Quarterly* 39 (2), 239–263.
- Fisher, A.T., Sonn, C.C., Bishop, B.J., 2002. *Psychological Sense of Community: Research, Applications and Implications*. Kluwer Academic/Plenum Publishers, New York.
- Fisher, R.J., Ackerman, D., 1998. The effects of recognition and group need on volunteerism: a social norm perspective. *Journal of Consumer Research* 25 (3), 262–275.
- Fornell, C., Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18 (1), 39–50.
- Ganesan, S., 1994. Determinants of long-term orientation in buyer–seller relationships. *Journal of Marketing* 58 (2), 1–19.
- Gruen, T.W., Summers, J.O., Acito, F., 2000. Relationship marketing activities, commitment, and membership behaviors in professional associations. *Journal of Marketing* 64 (3), 34–49.
- Gwinner, K.P., Gremler, D.D., Bitner, M.J., 1998. Relational benefits in services industries: the customer's perspective. *Journal of the Academy of Marketing Science* 26 (2), 101–114.
- Hagel III, J., Armstrong, A.G., 1997. *Net Gain*. Harvard Business School Press, Boston.
- Heskett, J.L., Sasser Jr., W.E., Schlesinger, L.A., 2002. *The Value Profit Chain: Treat Employees Like Customers and Customers Like Employees*. The Free Press, New York.
- Hofstede, G.H., 1980. *Culture's Consequences: International Differences in Work-Related Values*. Sage, Beverly Hills.
- Hogg, M.A., Hains, S.C., 1996. Intergroup relations and group solidarity: effects of group identification and social beliefs on depersonalized attraction. *Journal of Personality and Social Psychology* 70 (2), 295–309.
- Homans, G.C., 1958. Social behavior as exchange. *American Journal of Psychology* 63 (6), 597–606.
- Homburg, C., Wieseke, J., Hoyer, W.D., 2009. Social identity and the service-profit chain. *Journal of Marketing* 73 (2), 38–54.
- Hsu, M.-H., Ju, T.L., Yen, C.-H., Chang, C.-M., 2007. Knowledge sharing behavior in virtual communities: the relationship between trust, self-efficacy, and outcome expectations. *International Journal of Human-Computer Studies* 65 (2), 153–169.
- Hu, L., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling* 6 (1), 1–55.
- Isen, A.M., Baron, R.A., 1991. Affect and organizational behavior. In: Staw, B.M., Cummings, L.L. (Eds.), *Research in Organizational Behavior*, vol. 15. JAI Press, Greenwich, pp. 1–53.
- Jang, H., Finan, L., Ko, I., Koh, J., Kim, K., 2008. The influence of on-line brand community characteristics on community commitment and brand loyalty. *International Journal of Electronic Commerce* 12 (3), 57–80.
- Jöreskog, K., Sörbom, D., 1999. *LISREL 8: User's Reference Guide*. Scientific Software International, Chicago.
- Kang, I., Lee, K.C., Lee, S., Choi, J., 2007. Investigation of online community voluntary behavior using cognitive map. *Computers in Human Behavior* 23 (1), 111–126.
- Koh, J., Kim, Y.G., Butler, B., Bock, G.W., 2007. Encouraging participation in virtual communities. *Communications of the ACM* 50 (2), 69–74.
- Koufaris, M., 2002. Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research* 13 (2), 205–223.
- Lin, H.-F., 2008. Determinants of successful virtual communities: contributions from system characteristics and social factors. *Information and Management* 45 (8), 522–527.
- Lindell, M.K., Whitney, D.J., 2001. Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology* 86 (1), 114–121.
- Marsh, H.W., Balla, J.R., Hau, K.T., 1996. An evaluation of incremental fit indices: a clarification of mathematical and empirical properties. In: Marcoulides, G.A., Schumacker, R.E. (Eds.), *Advanced Structural Equation Modeling: Issues and Techniques*. Lawrence Erlbaum Associates, Mahwah, pp. 315–353.
- McAlexander, J.H., Schouten, J.W., Koenig, H.F., 2002. Building brand community. *Journal of Marketing* 66 (1), 38–54.
- McMillan, D.W., Chavis, D.M., 1986. Sense of community: a definition and theory. *Journal of Community Psychology* 14 (1), 6–23.
- Michener, H.S., DeLameter, J.D., 1999. *Theoretical Perspectives in Social Psychology*. Harcourt Brace College Publishers, Fort Worth.
- Mittal, V., Kamakura, W.A., 2001. Satisfaction, repurchase intent, and repurchase behavior: investigating the moderating effect of customer characteristics. *Journal of Marketing Research* 38 (1), 131–142.
- Nambisan, S., Baron, R.A., 2009. Virtual customer environments: testing a model of voluntary participation in value co-creation activities. *Journal of Product Innovation Management* 26 (4), 388–406.
- Novak, T.P., Hoffman, D.L., Yung, Y.F., 2000. Measuring the customer experience in online environments: a structural modeling approach. *Marketing Science* 19 (1), 22–42.
- Pavlou, P.A., 2003. Consumer acceptance of electronic commerce: integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce* 7 (3), 69–103.
- Pavlou, P.A., Liang, H.G., Xue, Y.J., 2007. Understanding and mitigating uncertainty in online exchange relationships: a principal-agent perspective. *MIS Quarterly* 31 (1), 105–136.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88 (5), 879–903.
- Preece, J., Shneiderman, B., 2009. The reader-to-leader framework: motivating technology-mediated social participation. *AIS Transactions on Human-Computer Interaction* 1 (1), 13–32.
- Ridings, C.M., Gefen, D., Arinze, B., 2002. Some antecedents and effects of trust in virtual communities. *Journal of Strategic Information Systems* 11 (3–4), 271–295.
- Rindfleisch, A., Malter, A.J., Ganesan, S., Moorman, C., 2008. Cross-sectional versus longitudinal survey research: concepts, findings, and guidelines. *Journal of Marketing Research* 45 (3), 261–279.
- Rothaermel, F.T., Sugiyama, S., 2001. Virtual internet communities and commercial success: individual and community-level theory grounded in the atypical case of TimeZone.com. *Journal of Management* 27 (3), 297–312.
- Schwartz, S.H., Bardi, A., 2001. Value hierarchies across cultures: taking a similarities perspective. *Journal of Cross-Cultural Psychology* 32 (3), 268–290.
- Scott, S.G., Lane, V.R., 2000. A stakeholder approach to organizational identity. *Academy of Management Review* 25 (1), 43–62.
- Sheth, J.N., Parvatiyar, A., 1995. Relationship marketing in consumer markets: antecedents and consequences. *Journal of the Academy of Marketing Science* 23 (4), 255–271.



- Smith, J.B., Barclay, D.W., 1997. The effects of organizational differences and trust on the effectiveness of selling partner relationships. *Journal of Marketing* 61 (1), 3–21.
- Tabachnik, B.G., Fidell, L.S., 2001. *Using Multivariate Statistics*, 4th ed. Allyn & Bacon, Needham Heights.
- Tajfel, H., Turner, J.C., 1986. The social identity theory of inter-group behavior. In: Worchel, S., Austin, W.G. (Eds.), *Psychology of Intergroup Relations*. Nelson-Hall, Chicago, pp. 7–24.
- Teo, H.-H., Chan, H.-C., Wei, K.-K., Zhang, Z., 2003. Evaluating information accessibility and community adaptivity features for sustaining virtual learning communities. *International Journal of Human-Computer Studies* 59 (5), 671–697.
- Thompson, S.A., Sinha, R.K., 2008. Brand communities and new product adoption: the influence and limits of oppositional loyalty. *Journal of Marketing* 72 (6), 65–80.
- Todd, P., Benbasat, I., 1999. Evaluating the impact of DSS, cognitive effort, and incentives on strategy selection. *Information Systems Research* 10 (4), 356–374.
- Triandis, H.C., 1995. *New Directions in Social Psychology: Individualism and Collectivism*. Westview, Boulder.
- Tsai, H.-T., Pai, P., 2012. Positive and negative aspects of online community cultivation: implications for online stores' relationship management. *Information and Management* 49 (2), 111–117.
- van Dolen, W.M., Dabholkar, P.A., de Ruyter, K., 2007. Satisfaction with online commercial group chat: the influence of perceived technology attributes, chat group characteristics, and advisor communication style. *Journal of Retailing* 83 (3), 339–358.
- Wasko, M.M., Faraj, S., 2000. "It is what one does": why people participate and help others in electronic communities of practice. *Journal of Strategic Information Systems* 9 (2–3), 155–173.
- Wasko, M.M., Faraj, S., 2005. Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly* 29 (1), 35–57.
- Wellman, B., Gulia, M., 1999. Net-surfers don't ride alone: virtual communities as communities. In: Wellman, B. (Ed.), *Networks in the Global Village*. Westview Press, Boulder, pp. 331–366.
- Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., Haythornthwaite, C., 1996. Computer networks as social networks: collaborative work, telework, and virtual community. *Annual Review of Sociology* 22, 213–238.
- Westbrook, R.A., Oliver, R.L., 1991. The dimensionality of consumption emotion patterns and consumer satisfaction. *Journal of Consumer Research* 18 (1), 84–91.
- Wiertz, C., de Ruyter, K., 2007. Beyond the call of duty: why customers contribute to firm-hosted commercial online communities. *Organization Studies* 28 (3), 347–376.
- Williams, L.J., Anderson, S.E., 1991. Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management* 17 (3), 601–617.
- Yang, S.J.H., Chen, I.Y.L., 2008. A social network-based system for supporting interactive collaboration in knowledge sharing over peer-to-peer network. *International Journal of Human-Computer Studies* 66 (1), 36–50.