The Effect of Members' Satisfaction with a Virtual Community on Member Participation

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ERIM REPORT SERIES *RESEARCH IN MANAGEMENT*	
ERIM Report Series reference number	ERS-2003-004-MKT
Publication	January 2003
Number of pages	51
Email address corresponding author	verhoef@few.eur.nl
Address	Erasmus Research Institute of Management (ERIM) Rotterdam School of Management / Faculteit Bedrijfskunde Rotterdam School of Economics / Faculteit Economische Wetenschappen Erasmus Universiteit Rotterdam P.O. Box 1738 3000 DR Rotterdam, The Netherlands Phone: +31 10 408 1182 Fax: +31 10 408 9640 Email: info@erim.eur.nl Internet: www.erim.eur.nl

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RESEARCH IN MANAGEMENT

BIBLIOGRAPHIC DATA AND CLASSIFICATIONS		
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Library of Congress Classification (LCC)	5001-6182	Business
	5410-5417.5	Marketing
	HD 58.8 HF 5415.335	Organizational change Consumer satisfaction
Journal of Economic Literature (JEL)	M	Business Administration and Business Economics
	M 31 C 44	Marketing Statistical Decision Theory
	M 39 L 22	Marketing and Advertising: Other Firm Organization
European Business Schools Library Group (EBSLG)	85 A	Business General
	280 G 255 A	Managing the marketing function Decision theory (general)
	260 N 100 F	Consumer behavior Organization Relationships
Gemeenschappelijke Onderwerpsontsluiting (GOO)		
Classification GOO	85.00	Bedrijfskunde, Organisatiekunde: algemeen
	85.40 85.03	Marketing Methoden en technieken, operations research
	85.40 85.05	Marketing Organisatiekunde
Keywords GOO	Bedrijfskunde / Bedrijfseconomie	
	Marketing / Besliskunde	
	Virtuele organisatie, Consumentengedrag	
Free keywords	virtual community, satisfaction, Internet, consumers, relationship age	

The Effect of Members' Satisfaction with a Virtual Community on Member Participation[1]

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[1] The authors wish to express their gratitude to Annabel Bousquet and a virtual community for their support of this project. They acknowledge the comments of Kay Lemon and Kristine Vlagsma on earlier drafts of this manuscript.

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The Effect of Members' Satisfaction with a Virtual Community on Member Participation

ABSTRACT

The authors develop a four-dimensional scale to measure members' satisfaction with virtual communities. The dimensions consist of members' satisfaction with member-member interactions, organizer-member interactions, organizer-community interactions, and the community's site. Using a sample of 3605 members of a virtual community the authors investigate the effect of each satisfaction dimension on member participation and the moderating effect of membership length on the links between the satisfaction dimensions and member participation. The results reveal that satisfaction with member-member interactions, organizer-member interactions and the community's site have positive effects on member participation. Satisfaction with organizer-community interactions has no effect on member participation. The findings also show that the linkages between the satisfaction dimensions and member participation are moderated by membership length.

INTRODUCTION

Already in the early phases of the Internet Rheingold (1993) believed that the Web would be transformed into a social Web of communities. The past decade has shown that Rheingold's vision has turned into reality. Today, a large number of virtual communities have been established on the Internet. These communities are often organized around topics or special interest groups, such as dating (match.com), traveling (virtualtourist.com), and parenting (babycenter.com), but they can also be organized around specific target groups (seniornet.org) or brands (e.g., Budweiser.com). In addition, key players like Microsoft network (MSN), Yahoo and ICQ have developed portals that facilitate and support the building and maintaining of communities. Each of these portals hosts thousands of communities related to an enormous variety of topics. Although many myths about online commercial opportunities have been laid to rest since the Internet bubble burst, virtual communities are proving their worth. They are among the most visited Internet Web sites. A Jupiter Media Metrix study showed that users of community features at Web sites are more frequent visitors and buyers, even if they only read and don't contribute to community exchanges (Brown, Tilton and Woodside 2002). Still, many virtual communities are not financially viable (Balasubramanian and Mahajan 2001). Competition for the attention of Internet users is harsh. Because of the seemingly endless stream of new virtual community initiatives, a key factor for success is to generate repeat visits and member participation in order to create a community that offers value both to its users and to its administrators.

In recent years there has been a boost in marketing management literature about strategies of virtual community building for commercial purposes (e.g., Hagel and Armstrong 1997; Kim 2000; Turban et al. 2002). However, solid research on

which to base investment and business decisions is still not widely available (Hoffman 2000). Within the E-marketing literature a number of studies focused on the performance of specific E-business initiatives, such as E-tailers and search engines. An important research topic is the understanding and measurement of E-satisfaction and E-service quality and its impact on customer loyalty (e.g., Reibstein 2002; Szymanski and Hise 2000; Wolfinbarger and Gilly 2002; Zeithaml, Parasuraman and Malhotra 2000; 2002). However, no studies have yet focused on the measurement of satisfaction within virtual communities and its impact on member participation. Due to the large differences in the structure of communities and other E-business models (Lechner and Hummel 2002), studies on E-satisfaction cannot be generalized to the context of virtual communities. Moreover, it may be argued that not satisfaction, but membership participation is the key-performance indicator of online-communities (cf. Duffy 1999). It is therefore essential to gain insight into the effect of members' satisfaction on member participation within virtual communities.

Against this background we draw on: (1) sociological and marketing literature on communities; (2) E-commerce literature, and; (3) customer satisfaction literature to develop a four-dimensional conceptualization of members' satisfaction with virtual communities. We use field interviews, on-line focus group discussions and a survey among over 3500 members of a virtual community to validate our conceptualization of members' satisfaction with this virtual community and to investigate the effect of each satisfaction dimension on member participation.

Previous research has shown that virtual communities are not static entities, but dynamic groupings of individuals that change and develop over time. After their initial visit, virtual community participants may develop into longtime experienced members. Along this trajectory an individual will play different roles within the

community and consequently also display different kinds of online behavior. This is also referred to as the community membership lifecycle (Kim 2000; Walther 1995). Therefore, we also investigate whether the effects of the satisfaction dimensions on member participation are different for novel and experienced members.

The structure of our article is as follows. We first discuss the virtual community concept and the interaction structures within virtual communities. Subsequently, we propose a four-dimensional conceptualization of virtual community satisfaction and discuss the hypothesized effects of each satisfaction dimension on member participation. Next, we describe our research method and the scale development and validation. After this we test the hypothesized relationships. Finally, we discuss theoretical and managerial implications and directions for future research.

VIRTUAL COMMUNITIES

Background

For a long time communities have been of interest to social scientists. Scholars like Tönnies (1922) and Weber (1964) have theorized extensively on the nature of communities and the social interactions that take place within them. Recently, researchers have taken an interest in the topic of virtual communities (Bagozzi and Dholakia 2002; Kozinets 2002) and the role of communities in marketing (McAlexander, Schouten and Koenig 2002; Muniz and O'Guinn 2001). The term virtual community was coined by Rheingold (1993), who viewed virtual communities as "social aggregations that emerge from the Net when enough people carry on public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace" (Rheingold 1993, p. 5). Building on this definition, Bagozzi and Dholakia (2002, p. 3) define virtual communities as "…mediated social

spaces in the digital environment that allow groups to form and be sustained primarily through ongoing communication processes." This definition emphasizes both the mediated communication processes and the sense of community, which are both central to many modern virtual communities, and will therefore be applied in this paper.

The origin of virtual communities can be traced back to the earliest days of the Internet and its predecessors. Early examples of virtual communities include the research-oriented CSNET, locally based communities like "The Well" in the San Francisco Bay Area, and multi-user environments (so-called MUD or MUDs) developed by computer hobbyists. The availability of large-scale access to the Internet through the World Wide Web led to the emergence of commercial communities aimed at generating profit through, for example, advertising, facilitating purchases or requiring fees for membership or use. The term virtual community is now widely used to refer to widely differing online social gatherings, including chat rooms, Usenet newsgroups, e-mail forums, and web-based forums (Hagel and Armstrong 1997; Kim 2000; Kozinets 1999). Virtual communities do not only vary in form, but also in organization. Some are created and managed by independent Internet users, while commercial parties control others. Some communities are heavily monitored by their administrators, while others don't have any formal regulation. Also the degree of openness among its participants may vary from anonymity to complete disclosure of members' identities. These differences in orientation and organization result in different interaction structures among the constituents of the virtual community.

Independent of the specific form and organization of a virtual community, social relationships are essential to its existence. Relationships are the sources of emotional support, companionship and supportive resources that are believed to be at

the heart of communities (Fischer, Bristor and Gainer 1996). Indeed, many scholars have come to regard communities simply as sets of social relationships among people. In line with this, Balasubramanian and Mahajan (2001) note that virtual communities consist of members that engage in broadly defined social exchanges that involve both the production and consumption of thoughts and opinions. Below, we will further discuss the social interactions that exist within virtual communities.

Interaction structures within virtual communities

In this study we focus on virtual communities of interest and relations that are organized by a commercial party, and that are aimed at facilitating social exchanges between virtual community members (cf. Hagel and Armstrong 1997). In doing so, the organizer may create a platform of members who form an interesting market for targeted online advertisements, deliver insight into consumer attitudes and behaviors that can be sold to third parties, or may even pay a membership fee to access the community. Such communities are widely spread and often focus on a particular target audience like travelers (virtualtourist.com), parents (babycenter.com) or senior citizens (seniornet.com). Figure 1 contains a representation of the interaction structure within this type of virtual community. The figure displays four essential elements of the interaction structure of such a virtual community: (1) interactions between the members; (2) the interaction between the organizer and individual members; (3) the interaction of the organizer with the community, and; (4) the community's site that facilitates interaction between all constituents. We continue with a discussion of each of these four elements.

-- Insert Figure 1: about here --

Member-member interactions: Community members socially interact and communicate with each other about the community's topic of interest. Social exchanges usually occur on-site, that is, within the context of the virtual community. On-site communication can be either public or private. Public conversations can be read by all members, and occur in a public community space such as a forum. Access to a private conversation is restricted to the sender and one or more selected receivers. Chat rooms often offer a functionality to make remarks "in private" (i.e., to specific participants within a larger group session). In addition to on-site communication, members may also engage in off-site communication, for example by exchanging email, phone calls or meeting in person (cf. Kozinets 2002).

Through participation and interaction members become embedded in the virtual community (Kozinets 1999). Prolonged engagement generally leads to higher levels of involvement with the community, turning visitors into members, members into contributors, and contributors into evangelists (Hagel and Armstrong 1997; Kim 2000). Walther's (1995) early meta-analysis of computer-mediated communication already suggested that Internet users progress from initially a-social information gathering to increasingly affiliate social activities. This point is extended by recent research into ritual behavior and the community life cycle by Alon, Brunel and Schneier Siegal (2001). They find that online activities in the first developmental stages of community building have an informational and instrumental function, while in later stages symbolic exchanges occur that are aimed at the creation of intimacy and relational cohesiveness. Later in the article we will develop hypotheses about the direct impact of membership length on member participation and the moderating effect of membership length on the linkages between the dimensions of satisfaction with a virtual community and member participation.

Organizer-member interactions: Although the interactions among members are a key a factor in the success of a virtual community, members' interactions with the organizer of the community may also be an important aspect of a virtual community (Balasubramanian and Mahajan 2001). Such interactions can be initiated either by the organizer of the community or by the member, and are often related to practical aspects of community life. Organizer-initiated interactions usually occur at the start of someone's membership, for example, when the organizer sends a welcome mail to the new member or appoints a "buddy" who helps the new member to get acquainted with the community. Member-initiated interactions with the organizer may occur when there are problems relating to, for example, community infrastructure, log-in procedures, or membership privileges. Furthermore, member-organizer interactions can also be initiated in situations in which the netiquette in the community is not abided. Members may contact the organizer when they find that the community atmosphere is damaged because of the behavior of one or more other members, and subsequently (or on their own initiative) organizers may warn, punish or even expel community members who misbehave.

Organizer-community interactions: Next to direct interactions with individual members, the organizer interacts with the community as a whole. The organizer has an important facilitating role, because it defines the community's focus (Muniz and O'Guinn 2001; Turban et al. 2002) and directs the development of the community (Kozinets 1999). Hagel and Armstrong (1997) argue that virtual communities need guidance, warmth and an occasional push. This is also referred to as active organizer-community interaction or virtual community management (Rothaermel and Sugiyama 2001). Active community management focuses on the organizational, topical and

social facilitation of the interactions between members. First of all, organizers define how the community is set up regarding its organizational structure. They decide about membership requirements (who may join), about what facilities are included in the community (e.g., chat, message boards, member homepages), and about how these facilities are run (e.g., whether members are allowed to start new discussion threads or whether that is decided by the organizer). Secondly, organizers may interfere with the content of the community by starting (and ending) discussion threads. Also, most organizers execute some level of editorial tasks by, for example, defining the content of the central home page where they may highlight certain (member) pages or message threads. Many virtual communities provide organizer-managed sections with guidelines, virtual tours and FAQs (frequently asked questions) designed to communicate the benefits and use of the community. Finally, organizers have an important role in defining and maintaining "the rules of the game". Usually this means including a section with netiquette in which the code of conduct within the community is described.

The community's site: Social interactions within virtual communities occur within the computer-mediated environment of the virtual community's site. Therefore, website technology and communication tools are essential to the functioning of a community. Organizers are first and foremost responsible for the technical well functioning of the community. At the very least, the site must be up and running without problems (Zeithaml, Parasuraman and Malhotra 2000), and should preferably be fast, uncluttered and easy-to navigate (Childers et al. 2001; Szymanski and Hise 2000). Site design is also considered an important element of e-satisfaction, and may be used to improve the attractiveness and stickiness of the community (Rust, Zeithaml and

Lemon 2000). Proper site design and technological functioning play a crucial role in turning the use of websites into a compelling experience (Novak, Hoffman and Yung 2000). Attractive community sites with well-designed graphics, animations and sounds may enhance the usage experience, although at the same time a too elaborate site might reduce the speed of interaction, which possibly leads to frustration and other negative emotions, which are likely to reduce members' satisfaction with the service (Wellman et al. 1996).

CONCEPTUAL MODEL AND HYPOTHESES

Having discussed the conceptual background of our research, we continue with the presentation and discussion of our conceptual model. In the model we explain member participation in virtual communities. In this paper, the term "member participation" refers to the time a member spends in the community. In line with the E-Commerce literature, we use self-reported measures of frequency and average duration of visits to the virtual community in order to determine how much time a member spends in the community within a defined time period (Turner, Grube and Meyers 2001). Following the satisfaction literature we argue that member participation is determined by members' satisfaction with the virtual community (cf. Bolton and Lemon 1999). We propose that overall satisfaction with the virtual community (hereafter referred to as VC-satisfaction) can be separated into members' satisfaction with each of the above-discussed four elements of virtual communities. We expect that membership length (i.e., novel vs. experienced members) may impact member participation, and that the effect of individual VC-satisfaction elements on member participation is moderated by membership length.

-- Insert Figure 2 about here --

Virtual community satisfaction

Anderson, Fornell and Lehmann (1994) define satisfaction as an overall evaluation based on the total purchase and consumption experience with a good or service over time. This definition contrasts satisfaction definitions that focus on the evaluation of single transactions or exchanges (e.g., Oliver 1996). In our conceptualization of VC-satisfaction we adopt the theoretical opinion that satisfaction is not confined to one recent exchange, but concerns the evaluation of exchanges over time, in what Anderson and colleagues (1994) have labeled a cumulative perspective to customer satisfaction. Within the literature on customer satisfaction, several authors have argued that it is beneficial to measure consumer satisfaction with different aspects of a service or company, resulting in a multi-dimensional construct of customer satisfaction (e.g., Bolton and Drew 1994). Having reviewed the literature on customer satisfaction, Homburg and Rudolph (2001, p.17) conclude that: "In summary, the multi-dimensional nature of the consumer satisfaction construct is evident." In line with this we operationalize VC-satisfaction as a multi-dimensional construct, in which each of our dimensions reflects consumers' satisfaction with one of the four elements of virtual communities discussed in our theoretical background section. The underlying rationale for the multidimensionality of VC-satisfaction is that the interaction structure of virtual communities consists of separate distinctive elements, which result in separate satisfaction judgments that cannot be captured in an one-dimensional VC-satisfaction construct. Our theorizing on VC-satisfaction is summarized by the proposition below.

Proposition: Virtual community satisfaction is a multi-dimensional construct with individual dimensions pertaining to members' satisfaction with: (1) member-member interactions; (2) organizer-member interactions; (3) organizer-community interaction, and; (4) the community's site.

The effect of VC-satisfaction on member participation

In line with the general literature on satisfaction, and also with Balasubramanian and Mahajan's (2001) discussion of virtual communities we posit that virtual community members seek to maximize subjective utility obtained from the virtual community by adapting their participation level in the community (Bolton 1998; Bolton and Lemon 1999; Verhoef, Franses and Hoekstra 2001). We assume that the four dimensions of VC-satisfaction shape members' expected utilities. Therefore, we expect a positive effect of these four dimensions on the extent (i.e., frequency and duration) of member participation. This expectation is in line with prior research in the satisfaction literature, in which satisfaction is found to positively affect service usage (Bolton and Lemon 1999). Hence, we hypothesize that:

H_{1a}: The four dimensions of VC-satisfaction have a positive effect on member participation in virtual communities.

We do not expect that the impact on membership participation is similar in magnitude for all four dimensions of VC-satisfaction. Specifically, we argue that satisfaction with member-member interactions has the largest impact on member participation. The connectedness of members is the key characteristic of communities (Muniz and O'Guinn 2001) and the communal feeling resulting from member-

member interactions sets the virtual community apart from other web environments (Rheingold 1993). Turner, Grube and Meyers (2001) have shown that the amount and depth of support that members receive from other virtual community members is positively correlated with VC-participation. Satisfaction with member-member interactions is therefore expected to be the most important determinant of member participation in virtual communities, a prominence which is reflected by the advice of Bagozzi and Dholakia (2002, p.18), who state that "the group, not the product, must be the object of nurturance, for virtual community builders." Thus we hypothesize that:

H_{1b}: Members' satisfaction with member-member interactions has, in comparison to the other three dimensions of VC-satisfaction, the strongest positive effect on member participation in virtual communities.

The direct effect of membership length on member participation

When people first enter a virtual community they are not familiar with the virtual community environment, the other members, and the "rules of the game" (Kozinets 2002). Knowledge on these aspects needs to be accumulated over time (Rothaermel and Sugiyama 2001). Compared to more experienced users, novices have fewer social ties with other members of the community and are to a lesser extent part of communal relationships. This lack of knowledge and social ties will prevent novice members to actively participate in many of the social interactions within the community. This implies that their interactions are more likely to revolve around the exchange of topical information. The utility provided by a virtual community will thus be smaller for novices than for experienced members, because novice users derive no

social (or symbolic) utility from their participation (Alon, Brunel and Schneier Siegal 2001).

As members move up in the community membership life cycle they may develop stronger social ties because they engage more in symbolic interaction behavior directed at relational cohesiveness (Walther 1995). Because the utility that can be retrieved from the community is now larger (including informational, social and symbolic exchanges), it is expected that members spend more and more time participating in the virtual community. Thus, membership length should positively affect member participation. Hence:

H_{2a}: Membership length has a positive effect on member participation.

Social interactions among members are however self-reinforcing and deepen over time (Abrahamson and Rosenkopf 1997). This means that the value of each specific interaction depends on the number of interactions that precede it (cf. Frenzen and Davis 1990). In other words, interactions with the community have increasing marginal returns, which may be represented by a positive quadratic effect of membership length on VC-participation.[i] We therefore propose that:

H_{2b}: The positive effect of membership length on member participation is self-reinforcing (i.e., becomes stronger as membership length increases).

The moderating effect of membership length

When membership length increases, members accumulate more and more experience with the virtual community. Such increase in experience may cause shifts

in the relative importance of the attributes of the community (Mittal, Kumar and Tsiros 1999). First of all, novice members are not familiar yet with the cultural norms, specialized language, and the identities of experts and other group members. Compared to more experienced members, they interact to a lesser degree with other members, and have less and weaker social ties within the community (Kozinets 1999). After a while, visitors spending more time in the community get acquainted with other members and learn the ropes of community practices. They often develop interpersonal relationships and a sense of community. In sum, we expect that the impact of satisfaction with member-member interactions on member participation will increase with the amount of time that a member has spent on the community. In other words:

H_{3a}: The positive effect of members' satisfaction with member-member interactions on member participation increases with membership length

In the early stages of membership, organizer-community and organizer-member interactions are essential. The organizer seeks to foster active participation of new members by sending welcome messages and helping new members find their way. This information is likely to be more concrete and easy to understand than interpersonal communications with and between other members. The rules and policies provided by the organizer play and important role in the decision of whether or not to engage in more active participation. When members become more experienced, such information will become less relevant and the impact of satisfaction with organizer-member and organizer-community interactions on member participation is likely to decrease. Thus:

H_{3b}: The positive effect of members' satisfaction with organizer-member interactions on member participation decreases with membership length.

H_{3c}: The positive effect of members' satisfaction with organizer-community interactions on member participation decreases with membership length.

An attractive and well-functioning community site is essential to members in all stages of the membership life cycle. Therefore we do not expect to find a moderating effect of membership length on the relationship between members' satisfaction with the community's site and member participation.

RESEARCH METHOD

Research context

Our research was primarily executed among members of one virtual community. This community had, at the time that the survey was conducted, 73851 members. Membership is free of charge and all members have access to a personal web page. The target group of the virtual community is young adults in the age of 12 to 24 years. The average member is 18 years of age. The community can be characterized as a community of interest and relations (cf. Hagel and Armstrong 1997).

Data collection

For the validation our four-dimensional conceptualization of members' satisfaction with virtual communities we used field interviews, on-line focus group discussions and a survey among members of the virtual community. The survey results were also used to test our hypotheses. We received support from the organizers

of the community to send the members a personalized e-mail that: (1) explained the purpose of the study; (2) requested members to participate, and; (3) included a link to the on-line questionnaire. These efforts yielded 3605 usable responses.

We checked for respondent bias by comparing the socio-demographics characteristics of the sample with those of the virtual community population. We found no significant differences in the sex, age, level of education and membership length. We used Armstrong and Overton's (1977) time-trend extrapolation procedure to test for non-response bias. We divided the sample into quartiles based on the number of days between sending the e-mail and the receipt of the completed questionnaire. In comparing early (1st quartile) and late (4th quartile) respondents, no significant differences emerged in the mean responses on any of the constructs. Together these results suggest that respondent and non-response bias were not a major problem. Table 1 shows the sample characteristics.

-- Insert Table 1 about here --

Measurement

Before describing how we measured VC-satisfaction, we will first discuss how we measured membership length and member participation. Membership length was measured by asking the respondent how long (s)he was a member of the virtual community (anchored by 1=less than one month and 5=more than one year). Membership participation was assessed by asking the respondents their frequency of visits (anchored by 1=less than once a month and 6=more than once a day) and their time spent during each visit to the community (anchored by 1=less than fifteen minutes and 4=more than an hour).

SCALE DEVELOPMENT AND TESTING

In line with current practice in the marketing literature our quantitative scale development, data collection and scale validation phases were preceded by a qualitative research phase, in which free-form interviews and online discussions were held with organizers and members of virtual communities to examine their thoughts and feelings on the subject.

Item generation

Using the previously mentioned four dimensions of VC-satisfaction, we set out to generate representative items that, collectively, defined the scope and meaning of each dimension. We used literature search, interviews and an on-line group discussion. The literature was used to determine if and how the dimensions of VC-satisfaction have been previously operationalized. We conducted interviews with a judgment sample of three academics, three managers of three virtual communities (including the virtual community central in our study), and fourteen members of the virtual community central in our study. Moreover we conducted two on-line group discussions with eleven and thirteen members of two virtual communities (other than the virtual community central to our study). The objective was to generate items for our four VC-satisfaction dimensions. The interviews and on-line groups discussions provided a rich set of possible items related to the different dimensions of VC-satisfaction.

In line with our conceptualization of VC-satisfaction we follow prior studies that measure satisfaction with "performance only" scales, as these scales have desirable psychometric properties. (e.g., Geyskens and Steenkamp 2000; Homburg and Rudolph 2001). Our initial set contained twenty-eight items to measure member's

VC-satisfaction on a five-point scale ranging from "strongly dissatisfied" (1) to "strongly satisfied" (5) with no verbal labels for scale points in-between. Eight items pertained to member-member interaction, six items to organizer-member interactions, nine items to organizer-community interaction, and five items to the community's site.

Pre-testing

We pre-tested the items in two phases. First, we asked five academics to critically evaluate the items from the standpoint of domain representativeness, item specificity and clarity of construction. Based on the critique received, we revised some items to improve their precision, we added three items and eliminated two items. After completing the first pretest one manager and five members of the virtual community central in our study were asked to complete the refined items and to indicate any ambiguity or other difficulty they experienced in responding to the items. Respondents could also offer any suggestions they deemed appropriate. Based on their comments the phrasing of some items was modified and one item was eliminated. At the end of the second phase of pre-testing the manager and the members reported no concerns, so that the questionnaire was ready for final administration. We report the items in the appendix.

Initial item purification

To purify the list of items we computed inter-item correlations and corrected item-to-total correlations for each item, taking the dimensions of VC-satisfaction one at a time, to obtain unidimensionality (Steenkamp and Van Trijp 1991). We eliminated items for which these correlations were not significant ($p<0.01$). The

unidimensionality of each purified scale was explored with exploratory factor analysis using an eigenvalue of 1.0 and factor loadings of 0.4 as the cut-off points. We explored the reliability of each purified, unidimensional scale by computing the reliability coefficient. In case where the coefficient alpha was smaller than 0.7, we removed the item with the lowest corrected item-to-total correlation until the requirement of 0.7 was met (Nunnally 1978). This procedure resulted in a reduced set of twenty-two items. The deleted items are marked in the appendix.

Further item purification

To further refine the measure we submitted the reduced set of twenty-two items, all together to a confirmatory factor analysis. We used the Maximum Likelihood method in LISREL8.3 (Jöreskog and Sörbom 1993) for parameter estimation. The modification indices indicated that the fit of the model could be improved by eliminating three items pertaining to the dimensions of member-member interaction, organizer-community interactions and organizer-member interactions respectively. Although the χ^2 of the re-specified model was significant (χ^2=896.96 with 146 degrees of freedom, p<0.001), the other goodness-of-fit indices indicated a good overall fit of the four dimensions of VC-satisfaction to the data: GFI=0.97; AGFI=0.97; NFI=0.96; NNFI=0.96; CFI=0.96; IFI=0.96; RMSEA=0.039 (see e.g., Bagozzi and Yi 1988; Baumgartner and Homburg 1996; Gerbing and Anderson 1992). The final results of our measurement model are reported in Table 2.

-- Insert Table 2 about here --

Convergent and discriminant validity

To assess convergent validity we checked if all factor loadings were significant (Bagozzi, Yi and Phillips 1991). As can be seen from table 2, all factor loadings were significantly different from zero as is evidenced by consistently large t-values. These findings offer strong support for the convergent validity of the dimensions of VC-satisfaction. We assessed discriminant validity across the four dimensions of VC-satisfaction by estimating two-factor first-order models for each possible pair of subscales twice: once constraining the correlation between the latent variables to unity, and once freeing the parameter. Without exception the χ^2 value was significantly lower for the unconstrained model, which suggests that the factors exhibit discriminant validity. To further assess discriminant validity we examined the 95% confidence intervals around all pair-wise correlations. The correlation matrix, shown in Table 3, reveals that discriminant validity is obtained, because none of the 95% confidence intervals for the pair wise latent-trait correlations encompass 1.0 (Bagozzi and Phillips 1982).

-- Insert Table 3 about here –

Together the results of the tests indicate a sufficient degree of reliability and validity and thus provide support for our proposition that virtual community satisfaction is a four-dimensional construct pertaining to members' satisfaction with: (1) member-member interactions; (2) organizer-member interactions; (3) organizer-community interactions, and; (4) the community's site.

HYPOTHESIS TESTING

Analysis

To test our hypotheses we used OLS regression analysis. In line with our definition of membership participation we multiplied the average visit frequency and the average visit duration to form membership participation. The items of the four VC-satisfaction dimensions were averaged to form composite scales. We mean-centered the composites and membership length to overcome possible multi-collinearity problems (Aiken and West 1991). In Table 4 we report the unstandardized coefficients of three models explaining membership participation. In model 1 we only included the four dimensions of satisfaction. The linear and quadratic terms pertaining to membership length are added in model 2 We added the interaction terms between membership length and the four dimensions of VC-satisfaction in model 3.

-- Insert Table 4 about here --

The effect of VC-satisfaction on member participation

We used model 1 to test H_{1a} and H_{1b}. Model 1 explains 11.0% of the variance in membership participation. The results show that members' satisfaction with member-member interactions ($b=0.935$; $p\leq 0.01$), organizer-member interactions ($b=0.276$; $p\leq 0.05$), and the community's site ($b=1.048$; $p\leq 0.01$) have a positive and significant effect on member participation. Members' satisfaction with organizer-community interactions has no significant effect on member participation. This means that H_{1a} is supported for three out of the four dimensions of VC-satisfaction.

To test hypothesis H_{1b} we estimated a number of restricted models in which the coefficients of pairs of VC-satisfaction dimensions were assumed to be equal. We

used a Wald-test to assess whether the coefficients were significantly different at a ≤ 0.05. The results show that the coefficients for members' satisfaction with member-member interactions and the community's site were significantly larger than the coefficients of members' satisfaction with organizer-member interactions and the organizer community interactions ($p \leq 0.05$). No significant differences ($p > 0.05$) were found between the coefficients of members' satisfaction with member-member interactions and the community's site. Thus, we find partial support for H_{1b}.

The direct effect of membership length on member participation

We used model 2 to test H_{2a} and H_{2b}. With the addition of the linear and quadratic terms pertaining to membership length the R^2 increases to 0.12 and the model's fit improves significantly ($p<0.01$). Both the linear ($b=0.276$; $p\leq0.01$) and quadratic ($b=0.185$; $p\leq0.01$) effects of membership length on membership participation were positive and significant. These results support H_{2a} and H_{2b}. We should be careful interpreting our estimation results, because we mean-centered our predictor variables. The combined linear and quadratic effects imply a U-shaped effect of membership length on member participation. For low values of membership length there is a small negative effect, while for high values of membership length there is a positive effect, which becomes stronger when membership length increases.

The moderated effect of membership length

We used model 3 to test H_{3a-c}. With the addition of the interaction terms the R^2 increases to 0.124. The sign and the significance of the coefficients of the main effects are similar to those in model 1 and 2, which indicates that multi-collinearity does not affect our estimation results (Leeflang et al., 2000). In support of H_{3a} the interaction

term of membership length and members' satisfaction with member-member interactions has a positive and significant effect on member participation (b=0.298; $p \leq 0.05$). The results also support H_{3c}, as the interaction term of membership length and members' satisfaction with organizer-community interactions has a negative and significant (b=-0.577; $p \leq 0.01$) effect on member participation. We find a positive and significant interaction effect of membership length and members' satisfaction with organizer-community interactions (b=0.248; $p \leq 0.05$) on member participation, which contradicts our H_{3b}. This discrepancy will be addressed in our discussion section. In line with our expectations, the interaction term pertaining to membership length and members' satisfaction with the community's site has a non-significant effect on member participation (b=0.052; $p > 0.05$).

THEORETICAL DISCUSSION

The aim of this study was to: (1) develop a multi-dimensional scale to measure members' satisfaction with virtual communities; (2) to investigate the effect of each satisfaction dimension on member participation; (3) to examine the direct effect of membership length on member participation, and; (4) to investigate the moderating influence of membership length on the links between the satisfaction dimensions and member participation. It represents one of the first attempts to better understand satisfaction in an on-line environment from the perspective of community members. The discussion is organized around the hypothesized relationships.

The effect of VC-satisfaction on member participation

Our study has several implications for marketing theory. Most important it highlights the complexity of conceptualizing members' satisfaction with virtual

communities. This is evident from the support we obtained for our proposition that VC-satisfaction is a four-dimensional construct that consists of members' satisfaction with member-member interactions, organizer-member interactions, organizer-community interactions, and the community's site. The origin of the multidimensional nature of members' satisfaction lies in the complex nature of the interaction structures within virtual communities. This leads to a conceptualization of VC-satisfaction that clearly differs from conceptualizations of satisfaction in traditional consumer and industrial goods and services sectors, but the multidimensional nature of VC-satisfaction is in line with other satisfaction research suggesting the multi-dimensional nature of satisfaction (e.g., Bolton and Drew 1994). Against this background the use of a single item to measure members' satisfaction with virtual communities seems not adequate.

Additionally our study contributes to a better understanding of member participation in virtual communities. We showed that members' satisfaction with member-member interactions, organizer-member interactions and the community's site has a positive effect on members' participation in the virtual community. Members' satisfaction with the organizer-community interactions has no effect on member participation. These findings again prove the importance to view members' satisfaction with a virtual community as a multidimensional phenomenon. While this has been stated in the literature before, for example for customer satisfaction in industrial markets (Homburg and Rudolph 2001), empirical evidence on the multidimensional nature of the effect of members' satisfaction with virtual communities on member participation has been nonexistent so far.

Furthermore, our study contributes to an improved comprehension of the different satisfaction dimensions' importance for member participation. Our results

show that members' satisfaction with member-member interactions and the community's site have the largest impact on member participation, while members' satisfaction with organizer-member interactions has the smallest impact. Members' satisfaction with the organizer-community interactions has, as mentioned earlier, no effect on member participation. The large impact of members' satisfaction with member-member interactions supports claims in the virtual community literature that the interactions within the community are the core of the community's existence (Bagozzi and Dholakia 2002; Fisher, Bristor and gainer 1996). The strong impact of members' satisfaction with the community's site is surprising from a virtual community perspective, but in line with prior research on e-satisfaction that argues that a well-functioning site is an important factor for successful e-marketing initiatives (Szymanski and Hise 2001; Zeithaml, Parasuraman and Malhotra 2000). Our finding that members' satisfaction with organizer-member interactions is also important (albeit significantly less than members' satisfaction with member-member interaction and the community's site) for member participation is in line with Hagel and Armstrong's (1997) notion that organizers need to interact with community members in order to maintain a successful community. The result that members' satisfaction with organizer-community interactions is not important for member participation is unexpected, because we a priori believed that active community management is likely to facilitate interactions among members. This warrants further research.

The direct and moderating effect of membership length

In addition to the effects of the dimensions of VC-satisfaction on member participation, our study contributes to a better knowledge of the importance of membership length for member participation in virtual communities. We show that

membership length has linear and quadratic effects on member participation. These results highlight the importance of long-time members for maintaining viable virtual communities, because of the self-reinforcing interactions among members of VC's (cf. Kretschmer, Klimis and Choi 1999).

Next to these direct effects we find that membership length moderates the effect of three of four dimensions of VC-satisfaction on member participation. The results reveal that membership length strengthens both the effect of members' satisfaction with member-member interactions and organizer-member interactions on member participation. The former effect is in line with our assumption that member-member interactions become more important for experienced users. This seems logical because social ties with other members need time to develop, and as these ties become stronger, members attach more and more importance to interactions with other members (cf. Abrahamson and Rosenkopf 1997). The latter effect runs counter to our expectation that organizer-member interactions become less important when members gain the experience that helps them to find their own way. One explanation might be that organizer-member interactions often continue after the first stage of membership. More experienced member may attach value to the organizer's tips and pointers with regard to community life, and experienced members engaging in discussions or other exchanges with organizers may even develop significant relationships with community organizers. Further research is however needed to establish and investigate this effect. We also find that the impact of members' satisfaction with organizer-community interactions on member participation decreases over time. Novice members find the role of the organizer more important, because the organizer plays an important role in setting the stage for interactions of the new member with the rest of the community. As membership length increases, and the

member becomes more experienced, there is clearly less need for guidance and help. This means that organizer-community interactions become less crucial, which translates into a decrease in the effect of satisfaction with organizer-community interactions on member participation.

Together our results with regard to the moderating effects of membership length suggest that the importance of three out of four satisfaction dimensions shift over time. This is in line with the notion of a virtual community membership lifecycle (Walther 1995; Kim 2000). In the early phases of the lifecycle members are likely to be hesitant to interact with other members and the organizer. However, when membership length increases, members become less reluctant and their interactions with other members and the organizer increasingly become self-reinforcing. The absence of an interaction effect between membership length and members' satisfaction with the virtual community's site implies that the community's site is important in all stages of the membership lifecycle.

MANAGERIAL IMPLICATIONS

Our results have important implications for managers. The practical inferences drawn from our results stem from the documentation of the practices of members of one virtual community of interests and relations. Therefore, our implications are not necessarily appropriate for other types of communities. The discussion of the implications is, again, organized around the hypothesized relationships.

The effect of VC-satisfaction on member participation

Increasing satisfaction is an important goal in business practice today and measurement of satisfaction is becoming increasingly common (Homburg and

Rudolph 2001). Against this background our research has several implications for organizers of virtual communities. Managers can use our scale to measure members' satisfaction with their community along each of the four dimensions by averaging the scores on items making up a dimension. Computing average scores for each individual dimension yields valuable insights on how well a virtual community deals with the different components of members' satisfaction. The detailed analysis may also reveal activities that need to be undertaken in order to increase members' satisfaction. If necessary, the scale can be supplemented to fit the characteristics or specific needs of another type of virtual community. The scale will be most valuable when used periodically to measure and monitor members' satisfaction using, for instance, monthly or quarterly data. This way the organizer of a virtual community would learn a great deal about the satisfaction of its members and what needs to be done to improve members' satisfaction.

The managerial significance of measuring members' satisfaction with virtual communities is stressed by the finding that members' satisfaction with member-member interactions, organizer-member interactions, and the community's site has positive effects on member participation. The existence, strength and direction of these links point out the actions that managers of virtual communities must take in order to improve member participation. This knowledge is important for the management to define priorities for improvement programs and decide about resource allocations.

Our findings point out that to raise member participation managers should focus on improving members' satisfaction with member-member interactions, the community's site and members' satisfaction with organizer-member interactions. Increasing member-member interactions is rather difficult, because the frequency and

quality of interactions among members is highly dependent upon the input of individual members. Therefore, managers of virtual communities should focus on facilitating member-member interactions by warranting the functioning of the community through up-to-date website technologies and communications (i.e., improving members' satisfaction with the site) and ensuring smooth organizer-member interactions (i.e., improving members' satisfaction with organizer-member interactions). In doing so, they should strike a balance between setting and enforcing the rules on one hand, and allowing community members freedom and sovereignty on the other hand.

The direct and moderating effect of membership length

Additionally, the knowledge that membership length has a direct effect on member participation justifies managerial attention to membership length as a virtual community's goal. Moreover, the knowledge that membership length moderates the relationship between members' satisfaction with the dimensions of virtual communities and member participation allows the management of communities to distinguish different user groups and define tailored improvement efforts to raise the satisfaction and participation of each group. For example, improving members' satisfaction with organizer-community interactions is especially important for novice members, because their participation increases substantially when their membership lengthens. Thus, organizers should manage the community for novice members in such a way that it fits their expectations of the functioning of the community, for example, in terms of netiquette. For experienced members member-member interactions and organizer-member interactions become more important. Thus in order to enhance the participation of experienced users organizers should try to increase

their satisfaction on these dimensions.

RESEARCH LIMITATIONS AND FUTURE RESEARCH

Our study is limited by several factors that should be addressed in future research. First, data for our study were collected from members of one virtual community of interest and relations. The reliability and validity of the VC-satisfaction scale and the hypotheses must be further tested with other virtual communities of interest and relations, and with other types of communities (cf. Hagel and Armstrong 1997). Especially more profit-oriented communities should be considered in order to link members' satisfaction to their purchase behavior within the community. Second, we used theory to provide insights about the direction of causality in our model. However, we collected data from a virtual community at one point in time to test our hypotheses. This means that our causal inferences about the effect of the dimensions of VC-satisfaction on member participation need to be confirmed by longitudinal studies. This is important because rival theories could also make the argument that increased member participation influences members' satisfaction with the dimensions of the virtual community. Third, the static design of our study does not take into account that member participation is likely to change between different stages of the membership life cycle. This may have affected the parameter estimates of the effect of membership length on member participation. The use of longitudinal data would enable researchers to follow the development of VC-satisfaction and its relationship to member participation over time. Fourth, we used membership length to determine a member's position in the membership lifecycle. Future research should consider using a self-typing measure to determine members' position in the lifecycle (cf. Jap and Ganesan 2000). Finally, data on member participation were collected using subjective

measures. Future research should aim to collect actual behavioral data that can be linked to VC-satisfaction.

Besides issues arising from the limitations of our study, we have defined three other avenues for future research. First, systematic research should be conducted that focuses on how organizers of virtual communities can boost member-member interactions. This is important to find out, because member-member interaction is the key determinant of members' satisfaction with virtual communities. Second, future research investigating the effect of the dimensions of VC-satisfaction on member participation could distinguish between members who actively contribute to the virtual community and those who merely consume the community's contents. Within the literature these two groups have been referred to as "posters' and 'lurkers" respectively (Kozinets 2002). Finally, it might be interesting to relate VC-satisfaction to other behavior and characteristics of community members, including (on-line) purchase behavior.

TABLE 1

Sample Characteristics

Sex:		**Daily Activities:**		**Level of Education:**	
- Male	33.2%	- Attending school:	84.5%	- Academic education	13.5%
- Female	66.8%	- Working:	13.3%	- Vocational education	20.1%
		- Other:	2.2%	- Secondary school	61.8%
				- Primary school	3.2%
				- Other	1.5%

TABLE 2

Results Confirmatory Factor Analysis

	SE	t-value	Composite reliability	Coefficient alpha
Satisfaction with MMI:				
- VC-MMI-1	0.65	40.07	0.77	0.77
- VC-MMI-2	0.64	39.44		
- VC-MMI-3	0.63	38.98		
- VC-MMI-4	0.63	39.12		
- VC-MMI-5	0.61	37.23		
Satisfaction with OMI:				
- VC-OMI-1	0.64	38.67	0.70	0.70
- VC-OMI-2	0.69	42.53		
- VC-OMI-3	0.66	40.63		
Satisfaction with OCI:				
- VC-OCI-1	0.60	36.89	0.78	0.77
- VC-OCI-2	0.59	36.19		
- VC-OCI-3	0.57	34.92		
- VC-OCI-4	0.61	37.92		
- VC-OCI-5	0.61	37.77		
- VC-OCI-6	0.64	40.55		
Satisfaction with CS:				
- VC-CS-1	0.57	34.12	0.75	0.75
- VC-CS-2	0.54	32.40		
- VC-SC-3	0.62	38.09		
- VC-CS-4	0.67	41.81		
- VC-CS-5	0.66	40.68		

Notes:

MMI= member-member interactions; OMI=organizer-member interactions;

OCI= organizer-community interactions; CS=community site

TABLE 3

Correlation Matrix of the Four Dimensions of VC-Satisfaction

Satisfaction with:	**Mean**	**S.D.**	**MMI**	**OMI**	**OCI**	**CS**
- Member-member interaction (MMI)	3.83	0.66	1.00			
- Organizer-member interaction (OMI)	3.79	0.75	0.59	1.00		
- Organizer-community interaction (OCI)	3.97	0.58	0.64	0.64	1.00	
- Community site (CS)	4.07	0.64	0.58	0.56	0.64	1.00

TABLE 4

Estimation Results Regression Model Explaining Member Participation

Variable	**Model 1**	**Model 2**	**Model 3**
Constant	7.664 [a]	7.460 [a]	7.466 [a]
Sat. with MMI	0.935 [a]	0.885 [a]	0.895 [a]
Sat. with OMI	0.276 [b]	0.292 [b]	0.307 [b]
Sat. with OCI	0.284	0.252	0.237
Sat. with CS	1.048 [a]	1.098 [a]	1.086 [a]
Mlength		0.276 [a]	0.275 [a]
Mlength^2		0.185 [a]	0.181 [a]
Mlength * Sat. MMI			0.298 [b]
Mlength * Sat. OMI			0.248 [b]
Mlength * Sat. OCI			-0.577 [a]
Mlength * Sat. CS			0.052
R^2	0.110	0.120	0.124
Adjusted R^2	0.109	0.118	0.121
F-value	109.25 [a]	79.87 [a]	49.736 [a]

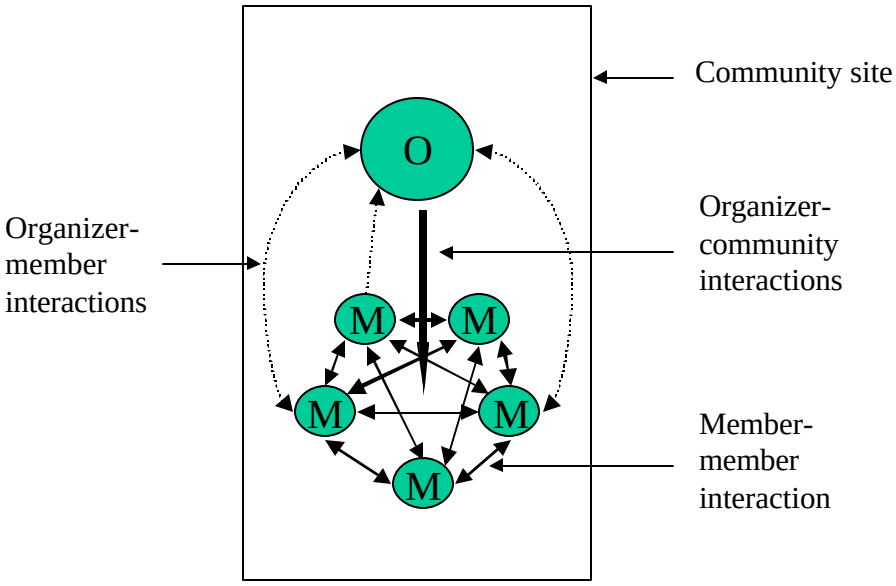
Notes:

[a] p-value ≤ 0.01; [b] p-value ≤ 0.05

FIGURE 1

Interaction Structures within Virtual Communities

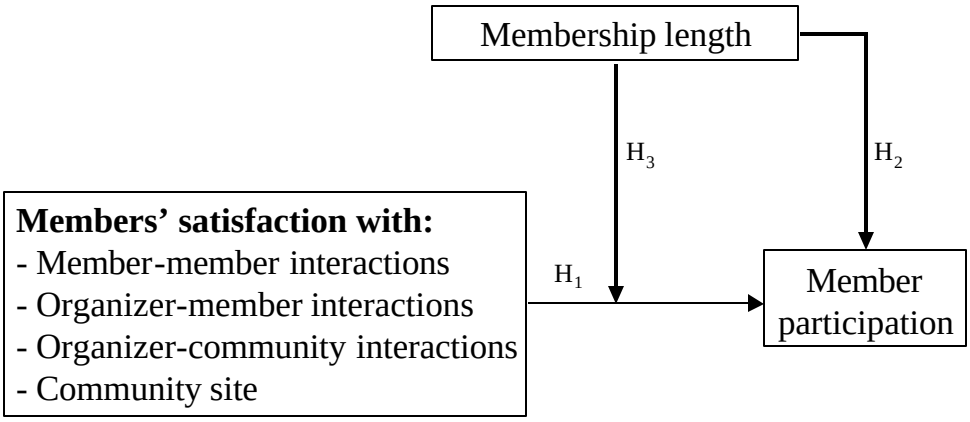
(Based on Balasubramanian and Mahajan 2001)



O = Organizer
M = Member

FIGURE 2

Conceptual Model on the Effect of VC-Satisfaction on Member Participation



APPENDIX: ITEMS

	How satisfied are you with……
- VC-MMI-1	… the interaction between you and other members of B2C within the community?
- VC-MMI-2	… the reaction that you get from other members about the things you do in B2C?
- VC-MMI-3	… the contribution of other members to B2C?
- VC-MMI-4	… what other members have written?
- VC-MMI-5	… the virtual friendships you have in B2C?
- VC-MMI-6	… the rules, values and norms that are generated by the members themselves?*
- VC-MMI-7	… the rules, values and norms that apply to members among themselves?*
- VC-MMI-8	… the interaction you have with other members of b2c in the real world?**
- VC-OMI-1	… the personal interaction between the editorial staff and yourself?
- VC-OMI-2	… the tuning of B2C to your individual desires?
- VC-OMI-3	… the reaction of the editorial staff if you contact them?
- VC-OMI-4	… the efforts that B2C puts into her members?*
- VC-OMI-5	… the things that are organized for members in the real world?*
- VC-OMI-6	… the extent to which the editorial staff keeps in the background?**
- VC-OCI-1	… the texts that the editorial staff places on the site?
- VC-OCI-2	… the freedom tha t members enjoy from the editorial staff?
- VC-OCI-3	… the rules that the editorial staff formulates that apply in B2C?
- VC-OCI-4	… the extent to which the editorial staff puts members' interest at the forefront?
- VC-OCI-5	… the contribution of the editorial staff with respect to the content of B2C?
- VC-OCI-6	… the boost that the editorial staff provides members with to participate in B2C?
- VC-OCI-7	… the choice you have to do different things in B2C?
- VC-OCI-8	… the different topics that go into the interests of members?*
- VC-OCI-9	… the ease with which everybody can become a member of B2C?**
- VC-CS-1	… the pictures on the site?
- VC-CS-2	… the technical functioning of the site?
- VC-CS-3	… the appearance of the site?
- VC-CS-4	… the thing that you can do on the site?
- VC-CS-5	… the atmosphere on the site?

Note: * Deleted during initial item purification
** Deleted during further item purification

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Endnotes

[i] The community life cycle concept (Alon et al. 2001) suggests that online relationships deepen over time until a certain maximum is reached, upon which a phase of separation sets in, and relationships may become less close and finally end. Most virtual communities, however, have developed fairly recently, and it is therefore most likely that they are still in the "growth" phase of the community life cycle.

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