



Relationship quality, community promotion and brand loyalty in virtual communities: Evidence from free software communities

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ABSTRACT

The Internet has favored the growth of collaborative platforms where marketers and consumers interact to develop more engaging products and services. These platforms are usually centered in a specific brand/product and their members are linked by a shared admiration to that brand. This paper analyzes one of the most powerful online collaborative platforms, the free software (FS) case, which involves a lot of virtual communities developed around products such as Linux or Android, the new Google's mobile operating system. Our purpose is to determine some of the main antecedents and consequences of the consumer involvement in this type of communities. Results have shown that satisfaction with a virtual community may increase the level of consumer participation in that community. At the same time, a greater identification with the virtual community may increase indirectly the consumer participation thanks to the enhancement of his/her satisfaction with the community. We have also found positive and significant effects of consumer identification and participation on the level of community promotion. Finally, positive and significant effects of consumer participation and satisfaction with the community on loyalty to the FS were also found. These findings allow us to conclude some interesting managerial implications.

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1. Introduction

With the increased connectivity afforded by the Internet (Hoffman, Novak, & Chatterjee, 1995) and the increased power of the online consumer (Kucuk & Krishnamurthy, 2006; Pitt, Watson, Berthon, Wynne, & Zinkhan, 2006), online communities have emerged as a major phenomenon (Hagel & Armstrong, 1997; Rheingold, 1993) leading to greater communication between companies and consumers (Pitta & Fowler, 2005). In other words, the Internet has favored the growth of collaborative groups where marketers and consumers interact to develop more engaging products and services. These platforms are usually centered in a specific mutual interest (a brand, a product, etc.) and their members are linked by a shared admiration to that interest. Therefore, due to its increasing importance, there is already a sizeable literature on online groups such as brand communities (Andersen, 2005; Muñiz & O'Guinn, 2001), user innovation communities (Lerner & Tirole, 2002, 2004; Von Hippel, 2001), open source communities (Krishnamurthy, 2009; Krishnamurthy & Tripathi, 2009) or e-tribes

(Kozinets, 1999), that tries to explain the main antecedents and consequences of consumer involvement in them. However, a brief analysis of this literature body allows us to identify three main gaps in this topic:

- *Precursory factors of community promotion:* The online community literature has focused on participation within the community rather than outside the community. It is conventional wisdom that the success of a community is based on the level of involvement of its members (Koh & Kim, 2004). However, promotion of the community to non-members has received lesser attention. There are some exceptions; for example, Krishnamurthy (2009) describes how members of the Firefox community use promotion behaviors to create a brand, build traffic and differentiate in the marketplace. Therefore, due to the relevant role that community promotion to non-members may have, more understanding of the antecedents and consequences of this promotion is needed.
- *Relationship quality and virtual communities:* The nature of relationship quality within a community, in terms of satisfaction levels, is not well understood. Not all members are satisfied with the online community. How do dissatisfied members behave in comparison to members who are satisfied?
- *Monetization of virtual communities:* In spite of the amazing growing of virtual communities and social networks (e.g. 350 millions

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of Facebook's users; 26 millions of Twitter's users only in the USA),¹ the monetization of this huge database of demographic and behavioral knowledge of consumer is pending (Clemons, 2009). Thus, in the case of virtual brand communities, it is important to understand how brands may generate incomes from these communities; for instance, what members' behaviors in the community may influence loyalty to the brand around which the community is developed.

This study contributes to close the aforementioned gaps offering the followings theoretical contributions:

- Little is known about what motivations induce people to be involved in a virtual community, especially, in terms of the promotion of the community to non-members. This recommendation is especially important because it may help to attract new members to the community, ensuring future participation in the community and guaranteeing its survival in the long term. To move on this topic, the influence of identification with a virtual community on the participation and promotion of the community is considered. This adds to the growing literature on the importance of social identification in developing commitment to a community (e.g. Bagozzi & Dholakia, 2006). Moreover, the influence of relationship quality (satisfaction) on promotion is investigated. Finally, the link between continuance participation in a virtual community and the promotion of the community is also considered.
- We study some antecedents and consequences of relationship quality within a community, in terms of satisfaction. Although the application of satisfaction to interactions as opposed to transactions has been increasingly used (e.g. Gustafsson, Johnson, & Roos, 2005), as far as know, this is one of first application of satisfaction to relationships in virtual communities. First, we analyze the effect of identification with a virtual community on consumer satisfaction. The reason behind this is the fact that identification with a group may help to satisfy some of the individuals' basic needs. Second, we analyze the role of satisfaction in developing consumer participation and community promotion. These behaviors reflect engagement with the community and satisfaction is a key determinant of commitment to a relationship (e.g. Bauer, Grether, & Leach, 2002).
- We examine how members' behavior in the community influence loyalty to the brand/product around which the community is developed. To be precise, the relationship between consumer participation in a virtual community and brand loyalty is analyzed. In addition, we also propose a positive effect of community promotion on brand loyalty.

To do that, this study focuses on free² software (FS) virtual communities for to three main reasons. Firstly, according to Bagozzi and Dholakia (2006), the three core components of a brand community proposed by Muñiz and O'Guinn (2001) can be observed in these types of virtual communities. In addition, although FS products are mostly developed by a set of computer programmers, they have started to behave as a brand in order to attract new consumers and create consumer desire (Ratto, 2005). Secondly, FS communities have experienced a great development in the last years and they have had a deep impact on business models (Benyoussef, Hoffmann,

Roehrich, & Valette-Florece, 2006). The rapid development and growing diffusion of FS (e.g. the operating system Linux) in both the corporate and domestic environment is just a clear instance of that. Finally, the analysis of the FS case is especially relevant in order to understand the behavior of virtual community members since FS is developed thanks to the collaboration and interaction among members of these communities. Thus, FS communities are a clear example of product development and distribution thanks to members' participation in the community.

It is very important to note that FS community members act not only as producers or developers of some type of software (e.g. a Linux distribution), but also as consumers of this software. We can consider these individuals as a mix of producers, consumers and promoters. Some people call them "prosumers" and can be defined as consumers with a very active role in the production process (Jensen & Hansen, 2007). So these communities are constituted by consumers with the ability of producing customized products and services. Moreover, these products and services may be freely distributed in an altruistic way. But the main cause to pertain to the FS community is the consumer role. This assumption – the consumer role – is what convert communities in a fantastic opportunity to analyze consumer needs. The prosumer figure is not limited to FS. For example, Starbucks offers to its consumers the possibility of suggesting whatever improvement they want for the store.³ If the suggestion is highly rated by the rest of the community members, Starbucks may adopt it. Therefore, the analysis of the FS case will help reveal the managerial relevance of these communities.

Therefore, we can consider that these communities have helped involve consumers in the value-creation process, which is a key aspect of the new dominant logic for marketing (Vargo & Lusch, 2008a). In this new service-centered logic, the consumer is viewed as a co-producer and thus maximizing consumer involvement in the value-creation process is needed in order to better fit his/her needs (Vargo & Lusch, 2004). According to these authors, the producer–consumer distinction is incoherent because, in a collaborative model of value creation, both parties reciprocally co-create value (Vargo & Lusch, 2008b). Each party brings their own unique resources into the process (Vargo & Lusch, 2008b) and, as a result, customers create value with the firm as opposed to the firm creating value for customers (Auh, Bell, McLeod, & Shih, 2007). Although there has been great debate on the difference between co-production and co-creation, Vargo and Lusch (2008a) argue that co-production is a component of co-creation of value that reflects the "participation in the development of the core offering itself". In the specific case of FS communities, we state that they help consumers collaborate in the development of FS products, co-participating in the value-creation process.

Taking into account the previous considerations, this work is structured as follows. Firstly, we carry out an in-depth review of the relevant literature concerning the variables included in the study. Secondly, we formalize the hypothesis. Then, we explain the process of data collection and the methodology employed. Lastly, the main conclusions of the work are discussed.

2. Literature review

2.1. Identification with the community

Identification with a virtual community may be defined as the strength of the consumer relationship with the virtual community and the other members (Algesheimer, Dholakia, & Herrmann, 2005). In other words, we may say that identification with a com-

¹ See Facebook stats in <http://www.facebook.com/press/info.php?statistics>. Twitter numbers are available in eMarketer (2009).

² It is important to note that, although commercial development of free software is not usual, "free" does not mean "non-commercial". Indeed, a free program may be available for commercial use, commercial development, and commercial distribution (www.fsf.org).

³ See more information at <http://mystarbucksidea.force.com/>.

munity is the degree to which an individual see himself as a part of the community. In addition, we may state that this is a collective identity in contrast to other identities that refer to an individual as being unique and separate (Bhattacharya, Hayagreeva, & Glynn, 1995). This shared identity helps increase the value of the community (Algesheimer et al., 2005).

Traditionally, several authors have noted that this kind of social identity includes both an affective and a cognitive component (Bergami & Bagozzi, 2000). On the one hand, the cognitive component implies that identification with the virtual community is the result of the perceived similarities with other community members and dissimilarities with non-members (Algesheimer et al., 2005). For instance, members of a given community use to share common objectives and values. On the other hand, the affective component means that identification appears as a consequence of the emotional involvement with the group. More specifically, it is shown as feelings of attachment and belonging to the community (Bagozzi & Dholakia, 2006).

2.2. Satisfaction

The concept of satisfaction has been widely analyzed in marketing literature (e.g. Geyskens, Steenkamp, & Kumar, 1999; Giese & Cote, 2000; Oliver, 1980). However, satisfaction is a complex concept with a wide variance of definitions in previous literature (Giese & Cote, 2000). Traditionally, satisfaction can be divided into two distinct perspectives (Geyskens et al., 1999). On the one hand, the first perspective considers satisfaction as an affective predisposition sustained by economic conditions. On the other hand, the second perspective, known as non-economic satisfaction, considers the concept using more psychological factors, such as a partner fulfilling promises or the ease of relationships with the aforementioned partner.

In order to propose a definitional framework of consumer satisfaction, Giese and Cote (2000) identified three general components in the concept of satisfaction: a response (emotional or cognitive); in a particular focus (a product, a consumption experience, a relationship, etc.); and at a particular time (before or after the election and consumption of a product, based on accumulated experience, etc.). Therefore, from a relational perspective (like the one used in this work), we may define satisfaction as an affective condition that results from a global evaluation of all the aspects that make up the relationship (Severt, 2002). This definition of satisfaction is similar to the elements associated to relationship quality. For instance, Johnson (1999) defines relationship quality as the overall depth and climate of a relationship, and Jarvelin and Lehtinen (1996) suggest that relationship quality reflects customer perceptions about the fulfillment of expectations, predictions, objectives and desires. In fact, satisfaction is considered as one of the components of relationship quality (Crosby, Evans, & Cowles, 1990). As a consequence, in this paper overall satisfaction is suggested as an indicator of the quality of the relationships within a FS virtual community.

Probably, the Expectation-Disconfirmation Theory (Oliver, 1980) is the most recognized model analyzing the satisfaction generation process. This Theory proposes that consumers have an initial expectation of a specific product/service and, after using the product/service, consumers develop perceptions regarding its performance. These perceptions are then compared to the initial expectation, determining to which extent the expectation is confirmed and next, consumer satisfaction is formed according to the level of expectations and their confirmation. In other words, if performance is better than expected, consumer will be satisfied. On the other hand, if performance is lower than expected, consumer will be unsatisfied.

However, the use of this Theory implies some difficulties (for example, it is necessary to collect a longitudinal data set) and some authors argue that this Theory has some weaknesses⁴ too (Bhattacharjee, 2001). Therefore, in this project, we will consider an overall measure of satisfaction adapted from well-recognized scales in literature (Brockman, 1998; Janda, Trocchia, & Gwinner, 2002). To be precise, our measure considers satisfaction as a global evaluation or attitude made by the individual about his/her participation in the virtual community and the benefits derived from this participation. Therefore, consumer satisfaction is not the result of a specific interaction in the virtual community, but that of a global evaluation of the relationship history between the consumer and the other community members. With each new interaction in the community the individual's perception is fed by new information, which will serve to determine the level of satisfaction at any given time.

2.3. Continuance participation

Consumer participation in a virtual community is a key factor in order to assure the success of the community. Indeed, continuance participation in joint activities in the community helps achieve the group's collective goals (Bagozzi & Dholakia, 2006) and it is a crucial aspect to guarantee the community endurance (Koh & Kim, 2004). To be precise, the level of participation is a key factor to perpetuate the virtual community (Algesheimer et al., 2005) since higher participation means a higher level of involvement with the community.

In this work, according to the recommendations of Koh and Kim (2004), we consider the following four factors to measure the participation behavior in a virtual community: (1) the motivation to interact with other community members, (2) the effort to stimulate the virtual community, (3) the contribution to the community with useful content and information in order to help other community members, and (4) the excitement with which an individual posts messages and responses in the community.

2.4. Community promotion

Promotion of a virtual community may be defined as the member's intentions to recommend the virtual community to non-members (Algesheimer et al., 2005). Therefore, these recommendations are also crucial in order to guarantee the community success since they help to perpetuate the virtual community in the long term by attracting potential new members to the community.

More specifically, community promotion includes factors such as recommending the virtual community to others, especially by

⁴ For instance, this Theory ignores potential changes in consumers' expectations once they have used the product/service. Indeed, it is usual that consumers update their expectations after their consumption experience since pre-usage expectations are based on second-hand information (e.g. opinion of others, information disseminated on mass media). As a consequence, the impact of these changes on successive purchase decisions is also ignored. As well, the definition of expectations varies among different Expectation-Disconfirmation studies. On the one hand, expectation has been defined in terms of pre-consumption beliefs about the overall performance of a product/service (e.g. Westbrook & Reilly, 1983). On the other hand, expectation has been defined as a set of beliefs regarding the different characteristics of the product (e.g. Oliver & Linda, 1981). Finally, it is also possible to find two different ways to measure the confirmation of expectations (Tse & Wilton, 1988). Firstly, confirmation of expectations may be measured following a *subtractive* approach (e.g. LaTour & Peat, 1979) in which the similarity between performance and the comparison standard is expressed as an algebraic function of the difference between post-experience perceptions and the previous expectations. Secondly, we can also find a *subjective* approach (e.g. Churchill & Surprenant, 1982). This alternative represents a subjective evaluation of the difference between product performance and the comparison standard (Tse & Wilton, 1988).

talking about the benefits of being a part of the community, inviting non-members to join the virtual community or emphasizing the positive aspects of the community when somebody criticized it. Finally, it is important to note that community members use to promote the community more frequently among their closer friends and relatives (Koh & Kim, 2004).

2.5. Loyalty

The concept of loyalty has been widely analyzed in the literature, especially from a marketing perspective (e.g. Dick & Basu, 1994; Evanschitzky, Gopalkrishnan, Plassmann, Niessing, & Meffert, 2006; Harris & Goode, 2004; Oliver, 1999). Although many definitions on the concept exist, it is the work of Oliver (1999) the one that provides a better explanation of loyalty. According to this author, loyalty reflects a deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior. That is, loyalty implies that the consumer gives preference to a particular brand or company, although satisfactory alternatives may exist. As a result, obtaining consumer loyalty has been considered a crucial aspect in order to achieve company success and sustainability over time (Keating, Rugimbana, & Quazi, 2003). Indeed, loyalty development has been an objective traditionally aimed at by managers (Andreassen, 1999) since this not only enables higher future purchase intention, but also favors higher intensity in positive word-of-mouth (Hallowell, 1996), lower price sensibility (Lynch & Ariely, 2000), more stable and bigger incomes (Knox & Denison, 2000) or low switching to competitors (Yi & La, 2004). In a simple manner, loyalty helps build relationships with consumers.

According to Hallowell (1996), loyalty behaviors are explained by the conviction that the value received from one seller is greater than the value available from other alternatives. Traditionally, loyalty has been analyzed from two different perspectives: *attitudinal* and *behavioural* (Auh et al., 2007; Hallowell, 1996). This fact implies that the concept of loyalty includes a psychological link, based on consumer feelings that motivate a general attachment to the people, products or services of an organization (Hallowell, 1996), and a behavioral component, based on aspects such as the frequency of visits to a store or the percentage of expense (Nilsson & Olsen, 1995). Although the first studies of customer loyalty were focused on the behavioral perspective, recently they have been carried out under the attitudinal approach (de Ruyter, Wetzel, & Bloemer, 1998). This is explained by the fact that the emphasis on consumer behavior met with initial acceptance of a product (e.g. Lipstein, 1959); however, this approach is not enough to explain how and why true loyalty develops and is maintained (e.g. Dick & Basu, 1994; Jacoby & Chestnut, 1978; Jacoby & Kyner, 1973).

Therefore, in this study we will use the attitudinal perspective to measure loyalty (focusing on the intention and predisposition to use FS products), since loyalty also refers to the customer's attitudinal state of intention to repurchase (Auh et al., 2007; Evanschitzky et al., 2006; Oliver, 1997). Indeed, intentions have been widely used to measure consumer behavior (e.g. Karahanna, Straub, & Chervany, 1999; Venkatesh, 1999). Each behavioral intention anticipates that a person will behave in a specified way (e.g. McKnight, Chervany, & Kacmar, 2002) and, as a result, actual behaviors and behavioral intentions are highly correlated (e.g. Venkatesh & Davis, 2000). Thus, the behavioral dimension of consumer loyalty may be simply a manifestation of the attitudinal state (Eshghi, Haughton, & Topi, 2007).

3. Formulation of hypotheses

In this research, we develop and test hypotheses concerning the levels of identification, satisfaction, participation, promotion and loyalty to FS communities in order to complement the findings of recent studies on this context (e.g. Bagozzi & Dholakia, 2006; Gallego, Luna, & Bueno, 2008; Oreg & Oded, 2008). This work adds to previous research by including the role of relationship quality, in terms of satisfaction, in determining consumer participation and promotion levels. Indeed, satisfaction has been widely used in the consumer behavior literature to explain post-usage and post-purchase behaviors (Bhattacharjee, 2001); for instance, in the well-known Expectation-Disconfirmation Theory (Oliver, 1980). Therefore, satisfaction may provide a useful approach for explaining both the continuance participation in the community and the consumer promotion of the community. In addition, we analyze the influence of identification with the community in both participation behavior and community promotion due to the fact that this factor has been traditionally found to be a relevant antecedent of community engagement (Algesheimer et al., 2005). Finally, we also examine the impact of consumer participation and promotion on consumer loyalty to the FS, which would help understand the importance of these communities for marketers.

3.1. The influence of satisfaction and identification on continuance participation and community promotion

As suggested by the Expectation-Disconfirmation Theory (Oliver, 1980), satisfaction reflects the degree to which expectations generated on previous occasions have been met. That is, in a virtual community, satisfaction is the result of the individual's perception that the benefits received from participating in the group are equal (or greater) to the expected benefits. Thus, if these member's expectations are met, s/he will feel satisfied and motivated to participate in the network. In other words, virtual communities cannot exist in the long term if the basic needs of their members are not met (Kim, Lee, & Himstra, 2004). If the community members are not satisfied, there would not be any incentive to participate in the community. Therefore, satisfaction seems to be a crucial antecedent of the continuance participation in a virtual community. Following the previous ideas, we propose our first hypothesis:

H1. Satisfaction in previous interactions within a virtual community has a positive influence on consumer participation in that community.

In addition, it is expected that consumers will develop affective feelings toward a virtual community as a result of their satisfaction in previous interactions in the community. Satisfaction contains a significant affective component, which is created through repeated positive experiences when using a product or service (Oliver, 1999). As a result, consumer satisfaction may help to develop profitable behaviors such as positive word-of-mouth (Boulding, Kalra, Staelin, & Zeithaml, 1993). In this line, it is reasonable to think that consumer satisfaction with previous interactions in a virtual community will influence the likelihood of promoting and recommending the community to non-members. Bearing this reasoning in mind, we propose our second hypothesis:

H2. Satisfaction in previous interactions within a virtual community has a positive influence on community promotion.

Recent studies have found that identification with a group has a positive influence on the motivation to interact and cooperate with other group members (e.g. Algesheimer et al., 2005). That is, community engagement and participation are positive community-related outcomes of consumer identification with the

collective. As an example, [Muñiz and Schau \(2005\)](#) found that members of the Apple Newton brand community still continue participating in the community, supporting other consumers and recommending the use of the product to non-members although it was no longer available. Broadly speaking, if the consumer is identified with a group, participation in joint activities in the collective will be viewed as congruent to personal values ([Bhattacharya & Sen, 2003](#)), so that s/he will be motivated to participate actively in the community and help other members. Consequently, we propose our third hypothesis:

H3. Identification with a virtual community has a positive influence on consumer participation in that community.

In addition, identification with a virtual community means that the consumer agrees with the community's norms, traditions, rituals, and objectives ([Algesheimer et al., 2005](#)). Therefore, to support the well-being of the community, members may promote the community in order to guarantee its survival in the long term. In addition, it is not uncommon for many community members to state their identification to the community by emphasizing the major attributes of the group, which serves to promote the community. For instance, many Linux User Group members publicly express their identification and loyalty to the group by emphasizing the characteristics of the community ([Torvalds & Diamond, 2001](#)).

Moreover, it is important to note that an existing identification with the community will favor the success of the promotion since identification also facilitates the integration and retention of the new members in the community. Thus, taking the previous considerations into account, we propose that:

H4. Identification with a virtual community has a positive influence on community promotion.

3.2. *The influence of identification on consumer satisfaction*

[Wellman \(2001\)](#) points out that communities have associated several benefits for individuals due to the interactions with similar people who share their enthusiasm. These interpersonal ties shared by members may allow the development of a sense of belonging and a social identity. Indeed, virtual communities may act as a social proxy for individual identification ([Brown, Broderick, & Lee, 2007](#)).

In addition, [Bressler and Grantham \(2000\)](#) expose that the feeling of belonging to a community helps satisfy some of the individuals' basic needs. More specifically, identification with a community may facilitate the answer to transcendent questions for the individual, such as: who am I?, where am I from?, how am I connected to the rest of the world?, to what extent am I related to other people?, what do I receive from other people?, what is important to me?, and so on. Therefore, being a part of a community implies that the individual is involved in a social group that covers some of his/her emotional needs. Finally, from a wider point of view, [Hagel and Armstrong \(1997\)](#) also propose that belonging to a virtual community may help satisfy the following consumer needs: sharing resources, establishing relationships, living fantasies and trading. Thus, taking into account all these ideas, we formulate the following hypothesis:

H5. Identification with a virtual community has a positive influence on satisfaction.

3.3. *The influence of continuance participation on community promotion*

Participation in a virtual community implies community engagement and loyalty ([Algesheimer et al., 2005](#)). Group affiliation not only influences the member's opinions and ideas regarding

specific issues, but also impulse individuals to return to the community in the future ([Bagozzi & Dholakia, 2002](#)). This loyalty to the community is the result of the member's beliefs that the quantity of value received from participating in the community is greater than the value of non-participating. In addition, one aspect associated to loyalty is positive word-of-mouth and recommendation ([Hallowell, 1996](#)). Therefore, it is reasonable to think that participation in the community activities may favor the community promotion to non-members.

Indeed, some authors have proposed that participation in the activities carried out in a virtual community may help to support community promotion and recruitment ([Andersen, 2005](#)). However, most of these studies have been conducted at the conceptual level. Therefore, with the aim of moving on this topic, we analyze empirically this relationship. Thus, we propose our sixth hypothesis:

H6. Consumer participation in a virtual community has a positive influence on community promotion.

3.4. *The influence of continuance participation and community promotion on loyalty*

Traditionally, it has been considered that participation in activities carried out in a brand community may foster consumer loyalty to the brand around which the community is developed ([Algesheimer et al., 2005](#); [Andersen, 2005](#); [Muñiz & O'Guinn, 2001](#)). For instance, we can note the work of [McAlexander, Schouten, and Koenig \(2002\)](#), who found that participation in events of the Jeep community favors consumer loyalty to the Jeep brand. That is, once consumers participate actively in a brand community, their commitment, identification and emotional ties with the brand or organization around which the virtual community is developed may increase ([Algesheimer et al., 2005](#)). Finally, all of these may favor higher levels of consumer loyalty to the brand around which the virtual community is developed ([Koh & Kim, 2004](#)). Indeed, a key aspect of participation in a brand community is the ongoing purchase and use of the brand products ([Algesheimer et al., 2005](#)).

Taking into account these considerations in the online context, we may state that participation in a virtual brand community will also have a positive influence on the member's intentions to use the brand products and services. Therefore, we propose the following hypothesis:

H7. Consumer participation in a virtual community has a positive influence on consumer loyalty to the brand around which the community is developed.

In a similar way, when community members promote their virtual brand community, for instance through positive word-of-mouth behaviors, they are coincidentally promoting the brand around which their community is developed ([Koh & Kim, 2004](#)). More specifically, members usually promote their community by emphasizing its attributes. Thus, community members also promote the brand when they promote their community since the major characteristic of a virtual brand community is the shared interest and admiration to the brand around which the community is centered. Indeed, most of the interactions carried out in a brand community are usually related to the brand (experiences with different brand products, support in the correct use of the brand, etc.).

In sum, community promotion may be also directly linked to brand loyalty. Bearing these considerations in mind, we propose our last hypothesis:

H8. Community promotion has a positive influence on consumer loyalty to the brand around which the community is developed.

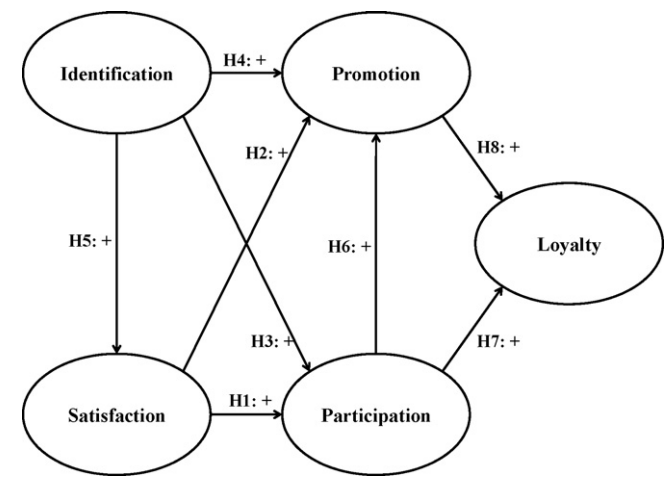


Fig. 1. Research model.

To sum up, the research framework including all the proposed relationships can be seen in Fig. 1.

4. Data collection

Data were collected thanks to a web survey using Spanish-speaking members of several FS virtual communities. This method of collecting the data is consistent with the habitual research practice in the online context (e.g. Bagozzi & Dholakia, 2006; Steenkamp & Geyskens, 2006). To obtain the responses, several posts were included on heavy traffic websites, email distribution lists and well-known electronic forums (all of them related to the FS).

The FS communities analyzed included some of the most popular and prestigious in the FS Hispanic community (e.g. Hispalinux, Guadalinex, Ubuntu España, EsDebian, Software Libre Argentina o Linux Uruguay). To be precise, each community was centered on one of the most important FS products such as Linux, Firefox or Ubuntu, and included members from the most important Hispanic countries (e.g. Spain, México, Argentina, Uruguay, Colombia, Venezuela or Chile). Likewise, the leading communities Free Software Foundation Europe and SourceForge, as well as the online newspaper Barrapunto collaborated with the project too.

All questions were measured on a 7-point Likert scale. We obtained 215 valid questionnaires representing 54 FS communities (atypical cases, repeated responses and incomplete questionnaires were controlled). Finally, to assess the representative nature of the data collected, we compared the socio-demographical characteristics of the sample with other studies on FS communities (e.g. Bagozzi & Dholakia, 2006) and results were very similar. To be precise, our respondents ranged in age from 16 to 70, with a mean age of 32.2 years, and 89% were male and 11% were female. In addition, their average experience with FS products was 3.84 years. Finally, of the entire sample, there were 158 (73.5%) Spain-residents and the other 26.5% belonged to a total of 14 other Hispanic countries. Argentina (9.3%), Colombia (3.3%), Chile (2.8%), Venezuela (2.3%) and Mexico (2.3%) were the next Hispanic countries most represented in the sample.

5. Measures validation

An in-depth review of the relevant literature concerning relationship marketing and e-marketing was developed to propose an initial set of items to measure the latent constructs. This review helped guarantee the content validity of the scales. We also tested face validity through a variation of the Zaichkowsky

Table 1
Discriminant validity.

PAIR of constructs	Correlation	95% confidence interval	
IDENT-SAT	.614*	.48856	.73944
IDENT-PARTI	.416*	.28272	.54928
IDENT-PROM	.428*	.25356	.60244
IDENT-LOY	.440*	.28516	.59484
SAT-PARTI	.330*	.16144	.49856
SAT-PROM	.419*	.2328	.6052
SAT-LOY	.347*	.18432	.50968
PARTI-PROM	.548*	.39512	.70088
PARTI-LOY	.416*	.28664	.54536
PROM-LOY	.329*	.18396	.47404

*Expresses that coefficients are significant at the level of .01.

method (1985). Following this method, each item was qualified by a panel of experts as “clearly representative”, “somewhat representative” or “not representative of the construct of interest”. Finally, items were retained if a high level of consensus was observed among the experts (Lichtenstein, Netemeyer, & Burton, 1990).

The first step in the process of measures validation was an exploratory analysis of reliability and dimensionality. In this sense, the Cronbach's alpha indicator,⁵ the item-total correlation⁶ and principal components analysis were used to assess the initial reliability and dimensionality of the scales. All items were adjusted to the required levels and only one factor was extracted from each scale: identification, satisfaction, participation, community promotion and loyalty.

In order to confirm the dimensional structure of the scales, we used the Confirmatory Factor Analysis. For these tasks, the statistical software EQS v.6.1 was employed and we used Robust Maximum Likelihood as an estimation method. The criteria proposed by Jöreskog and Sörbom (1993) were followed in order to depurate the scales.⁷ Following these recommendations, we obtained acceptable levels of convergence, R^2 and model fit (Chi-square = 198.711, 80 d.f., $p < .001$; Bentler–Bonett Normed Fit Index = .873; Bentler–Bonett Nonnormed Fit Index = .912; Comparative Fit Index (CFI) = .933; Bollen (IFI) Fit Index = .934; Root Mean Sq. Error of App. (RMESA) = .066; 90% confidence interval of RMESA (.050, .081)).

Additionally, we used the composite reliability indicator to assess construct reliability (Jöreskog, 1971). We obtained values above .65, exceeding the benchmarks that are suggested as acceptable (Steenkamp & Geyskens, 2006). Finally, convergent validity was tested by checking that the factor loadings of the confirmatory model were statistically significant (level of .01) and higher than .5 points (Steenkamp & Geyskens, 2006). On the other hand, discriminant validity was tested in two ways (see Table 1): Firstly, we checked that the correlations between the variables in the confirmatory model were not much higher than .8 points (Bagozzi, 1994). Secondly, we checked that the value 1 did not appear in the confidence interval of the correlations between the different variables. Results showed an acceptable level of convergent and discriminant validity.

⁵ Considering a minimum value of .7 (Nunnally, 1978).

⁶ Considering a minimum value of .3 (Nurosis, 1993).

⁷ To be precise, these criteria are:

- The weak convergence criterion, which means eliminating indicators that do not show significant factor regression coefficients (Student's $t > 2.58$; $p = .01$).
- The strong convergence criterion, which involves eliminating non-substantial indicators; that is, those whose standardized coefficients are lower than .5.
- According to the suggestion of Jöreskog and Sörbom, we also eliminated the indicators that least contribute to the explanation of the model, taking $R^2 < .3$ as a cut-off point.

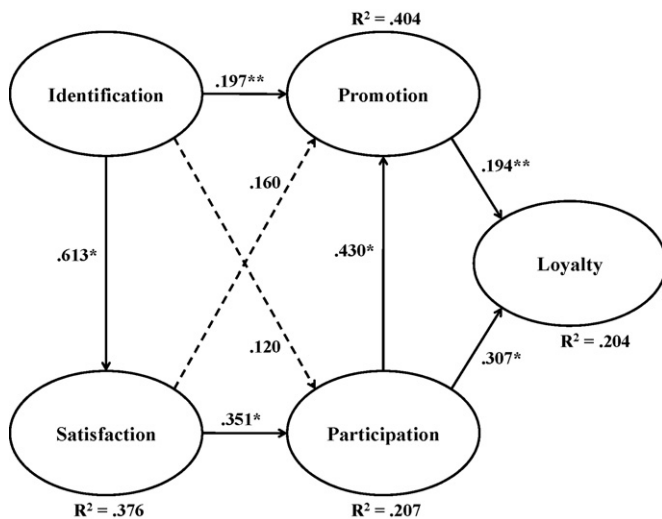


Fig. 2. The structural equation model.

6. Results

To test the hypotheses we developed a structural equation model. Fig. 2 shows the results corresponding to Hypotheses 1–8. Results reveal the acceptance of Hypotheses 1, 5, 6 and 7 to a level of .01, and Hypotheses 4 and 8 to a level of .1. On the other hand, Hypotheses 2 and 3 were not supported. Lastly, the model fit showed acceptable values (Chi-square = 183.740, 69 d.f., $p < .001$; Bentler–Bonett Normed Fit Index = .875; Bentler–Bonett Non-normed Fit Index = .906; Comparative Fit Index (CFI) = .931; Bollen (IFI) Fit Index = .933; Root Mean Sq. Error of App. (RMSEA) = .073; 90% confidence interval of RMSEA (.056, .089); normed Chi-square = 2.6629).

It was also notable that we could partially explain both participation in a virtual community ($R^2 = .207$) and promotion of the community ($R^2 = .404$), which are two key factors to guarantee the community survival in the long term. To be precise, according to the standardized estimations, we may say that participation is positively influenced by the consumer satisfaction with previous interactions in the community ($\beta = .351$; $p < .01$), but the direct effect of identification with the collective on participation is non-significant ($\beta = .120$; $p > .1$). Therefore, H1 was supported whereas H3 was rejected. At the same time, H4 and H5 were proofed since community promotion is influenced by both the consumer identification with the community ($\beta = .197$; $p < .1$) and his/her participation level ($\beta = .430$; $p < .01$). On the other hand, the effect of satisfaction on community promotion is non-significant ($\beta = .160$; $p > .1$), so that H2 was rejected. In addition, identification with the community has a positive influence on consumer satisfaction ($\beta = .613$; $p < .01$), supporting H6. As a result, it is possible to say that identification with the group influences indirectly participation in a virtual community through satisfaction, which exerts a mediating role in the development of consumer participation in a virtual community. Finally, this model allows us to partially explain consumers' loyalty to the mutual interest of the virtual community – the FS in this case – ($R^2 = .204$). In this line, consumer loyalty has been found to be directly influenced by consumer participation in the virtual community ($\beta = .307$; $p < .01$) and, in a lesser extent, by consumer promotion of the virtual community ($\beta = .194$; $p < .1$), confirming H7 and H8 respectively.

6.1. Rival model

In addition, we also compared our proposed model with a rival one since it has been traditionally agreed that researchers should

Table 2

Proposed model vs. rival model.

	Proposed model	Rival model
PATH (standardized solution)		
IDENT → SAT	.613*	.615*
IDENT → PARTI	.120 (n.s.)	.120 (n.s.)
IDENT → PROM	.197***	.202***
SAT → PARTI	.351*	.342***
SAT → PROM	.160 (n.s.)	.125 (n.s.)
PARTI → PROM	.430*	.429*
PARTI → LOY	.307*	.251**
PROM → LOY	.194***	.030 (n.s.)
SAT → LOY	–	.315*
IDENT → LOY	–	.029 (n.s.)
Model fit		
CFI	.931	.931
χ^2 /d.f.	χ^2 /d.f. = 2.6629 (χ^2 = 183.740, 69 d.f.)	χ^2 /d.f. = 2.5418 (χ^2 = 170.298, 67 d.f.)
R^2		
Loyalty	.204	.263

n.s. expresses that coefficients are non-significant.

* expresses that coefficients are significant at the level of .01.

** expresses that coefficients are significant at the level of .05.

*** expresses that coefficients are significant at the level of .1.

contrast rival models and not just evaluate the performance of a proposed one (Bloemer & Odekerken-Schröder, 2003; Morgan & Hunt, 1994). Indeed, one of the advantages of structural equation modelling is that it allows the comparison of several models (e.g. Mitchell, 1992) and, according to Bloemer and Odekerken-Schröder (2003), the comparison of the hypothesized model with a rival one may serve to strengthen the support for the meaningfulness and robustness of the proposed model. Concerning our model, it is important to note that continuance participation and promotion of the community are fully mediating the satisfaction-loyalty and identification-loyalty links. Thus, according to Morgan and Hunt (1994), a rival view of this moderating role would be a model allowing direct paths from the precursors to the outcomes too. Therefore, the rival model also includes the direct effect of satisfaction with previous experiences and identification with the community on consumer loyalty to the FS (the mutual interest of the communities analyzed).

Based upon Morgan and Hunt (1994), we compare our model with its rival on the following terms: (1) overall fit, as measured by the CFI indicator⁸; (2) parsimony, as measured by the ratio of Chi-square to degrees of freedom⁹; (3) percentage of the model paths that were statistically significant; and (4) the ability to explain the variance of the endogenous constructs. Results can be seen in Table 2.

Although the comparison of the proposed model and the rival one reveals that both models are quite similar, some of the results of this rival model are quite interesting. First, we have seen that satisfaction with previous experiences in the community also exerts a significant direct effect on loyalty to the mutual interest of the community, suggesting an additional path to the ones proposed in our research model. The reason behind this may be found in the fact that satisfied consumers in the community may perceive that the FS offers an added value through the FS communities (i.e. they can collaborate in the development of FS products, thus participat-

⁸ Recommended values for the CFI indicator are near to 1, taking .9 as a cut-off point (Bansal & Voyer, 2000).

⁹ To achieve a good level of parsimony, the ratio of Chi-square to degrees of freedom, also known as normed Chi-square, must be in the range between 1 and 2 (Bansal & Voyer, 2000). However, values lower than 3 can be also considered as adequate (Bloemer & Odekerken-Schröder, 2003).

ing in the value-creation process). In response to this added value that makes them feel more satisfied, they develop preference for the FS, the mutual interest of the communities analyzed in this work. This finding is consistent with the new dominant logic for marketing which suggests that consumers are co-creators of value (Vargo & Lusch, 2004, 2008a), so that the enhancement of the co-creation experience may make them feel more satisfied. In this line, co-production has been found to positively affect consumer attitudinal loyalty in previous studies (Auh et al., 2007). In addition, the rival model suggests that the effect of promotion on loyalty becomes non-significant in the presence of new direct antecedents that have a deeper impact on loyalty. That is, although community promotion and loyalty may be related, promotion becomes a less relevant variable when we consider other determinant factors.

Therefore, these findings allow us to conclude that satisfaction with a virtual community affect not only community-related behaviors such as continuance participation, but also behaviors related to the mutual interest of the community such as loyalty to the FS. On the other hand, the effect of identification with a virtual community seems to be weaker and more related to community promotion, and indirectly (through satisfaction) to continuance participation and loyalty to the FS.

7. Conclusions

From a marketing perspective, the analysis of virtual brand communities is especially relevant. More specifically, the importance of these communities is twofold. Firstly, virtual brand communities can be used by individuals to take part in discussions in order to inform and influence fellow consumers about products, brands or organizations (Kozinets, 2002). These social groups have a real existence for their participants (Muñiz & O'Guinn, 2001) and therefore, peer recommendations in these online communities may affect their members' behavior (Smith, Menon, & Sivakumar, 2005). Indeed, electronic word-of-mouth is found to be a powerful force in persuasion (Sen & Lerman, 2007). Secondly, virtual communities may help identify the needs and desires of particular individuals or groups of people (Kozinets, 2002). Thus, all this information may serve to achieve a more effective market segmentation (Flavián & Guinalíu, 2005) and, as a result, obtain increased margins (Von Campenhausen & Lübben, 2002). Therefore, a more in-depth understanding of the drivers and outcomes of consumer involvement in these communities should be a main concern for both marketers and academicians.

However, several gaps still exist in the literature on virtual communities, such as the lack of analysis of non-internal promotion, the study of relationship quality or the strategies to monetize this new communication channels. With the aim of moving on these topics we have analyzed consumer behavior in FS virtual communities, which is an adequate research environment since: (1) the three core components of a brand community can be observed in them, (2) these communities have experienced a great development in the last years, and (3) there is an intrinsic nature of collaboration and interaction among members of these communities.

7.1. Theoretical contributions

Firstly, we have discovered some key factors in order to develop successful communities. To do that, we have analyzed the antecedents of consumer participation in a virtual community and promotion of the community since these are two crucial aspects of community engagement that help guarantee the community survival in the long term. More specifically, results have

shown that satisfaction with a virtual community may increase the participation in that community, which can be considered as a first contribution of this research since the role of satisfaction in developing consumer participation in a community has not been analyzed in-depth. At the same time, we have found that the direct influence of identification on participation seems to be non-significant. However, a greater identification with the virtual community may still increase indirectly consumer participation in that community thanks to the enhancement of his/her satisfaction with the virtual community. This is explained by the fact that identification with a group may help satisfy some of the basic consumer needs (Bressler & Grantham, 2000; Hagel & Armstrong, 1997) and thus, once the individual is satisfied, s/he will be motivated to participate again in the community. Thus, the inclusion of satisfaction helps understand consumer behavior in virtual communities in more detail. Indeed, in previous studies in which satisfaction is not considered, the existence of a social identity was found to affect participation intentions in a positive and significant way (e.g. Bagozzi & Dholakia, 2006). Lastly, concerning the promotion of the community, which is also a key aspect to guarantee the development of sustainable communities and that has not been treated in-depth in previous studies, we have found positive and significant effects of participation in a virtual community and, in a lesser extent, consumer identification with the community on the level of non-internal community promotion. The weaker than expected effect of identification on promotion may be explained by the fact that the goal of these communities is to develop and discuss about FS products and therefore, the inclusion of new members will be only of help if they have the required knowledge to add value to the community. Therefore, although identified consumers may want to promote the community in order to guarantee its survival in the long term, this promotion to non-members may not be widespread, but only limited to those people with enough knowledge to contribute to the community. In addition, the effect of satisfaction on community promotion was surprisingly non-significant. The reason behind this may be found in the fact that consumers may prefer to continue interacting in the community with the same individuals that help satisfy their needs rather than with new members that join the community due to the positive comments about it made by old members. As a result, consumer satisfaction would not have a positive influence on promotion. All these findings have allowed us to explain quite clearly the concepts of consumer participation in a virtual community ($R^2 = .207$) and community promotion ($R^2 = .404$).

Secondly, in the current research, we have studied the influence of a virtual brand community on consumer behavior. To be precise, we have found a positive and significant effect of consumer participation in a virtual community on loyalty to the mutual interest around which the community is centered (the FS in this case). This result is in line with previous research on brand communities (Algesheimer et al., 2005; Bagozzi & Dholakia, 2006; Muñiz & O'Guinn, 2001), and can be explained by the development of emotional ties with the FS that emerge as a consequence of the interactions with other community members, which are usually based on topics related to the FS (experiences with different FS products, support in the correct use of the FS products, etc.). Besides, we have also found that community promotion and loyalty to the mutual interest of the community are related. This link may be explained by the fact that once consumers promote a community they are coincidentally promoting the mutual interest of the community (the FS in this case), since it is the core characteristic of the community and keeps community members joined. This finding also implies that participation in the community have an additional indirect effect on consumer loyalty through the promotion of the community. On the whole, we found that participation not only influences brand loyalty directly, but also indirectly, which pro-

vides support to the fact that virtual communities have associated relevant effects on consumer behavior that should be considered by marketers. Thus, our model has allowed us to partially explain the consumer loyalty to the FS ($R^2 = .204$), the mutual interest around which virtual communities analyzed in this study are centered. However, it is important to note that the effect of promotion on loyalty becomes less relevant when we considered additional antecedents such as satisfaction with previous interactions in the community, which is found to influence consumer loyalty in a greater extent. This implies that the added value that consumers obtain in the FS communities may induce them to give preference to FS products, since these products are the core interest of the communities analyzed. In addition, the finding of this path allows us to explain consumer loyalty to the FS in more detail ($R^2 = .263$), noting the relevant role of satisfaction in forming consumer loyalty to the FS.

7.2. Managerial implications

As we have noted before, these findings have considerable managerial value due to the fact that they link the existence of virtual communities to consumer behaviors that may affect profitability (e.g. consumer loyalty). In addition, our findings support the idea of recent developments in marketing thought that co-production and co-creation experience may provide several opportunities for creating customer value (e.g. Auh et al., 2007; Prahalad & Ramaswamy, 2004), in this case through participation in FS virtual communities. In this respect, this study offers some alternatives in order to increase the brand loyalty thanks to the development of virtual communities and the promotion of consumer participation in the activities carried out in those communities:

- First of all, firms should promote group cohesion and communication among the community members in order to favor consumer identification with the virtual community. To do that, it would be a good idea to carry out actions that may increase consumer commitment to the virtual community. For instance, firms should organize meetings among community members and ask them for suggestions about products. In addition, these actions will also foster interactions among community members, which will help to guarantee the community survival in the long term.
- Secondly, firms should try to satisfy in the virtual community some of the consumers needs. For example, it would be useful to offer detailed information about brand products in the community or make special offers to virtual community members. In addition, the design is a crucial aspect in the Internet (Geissler, 2001) and therefore, the virtual community should be created according to its members' needs, and not with those of the company that promotes it (Flavián & Guinalíu, 2005). As a result, individuals will perceive that they can satisfy their needs and demands in the virtual community, so that they will be motivated to participate in the community.
- Thirdly, to guarantee the sustainability of the virtual community, the evolution of its members' needs and interests should be constantly analyzed (Wang, Yu, & Fesenmaier, 2002).
- Finally, it would be interesting to include a reference to the community in the brand products or advertisements in order to increase the awareness of the virtual community.

Following the above recommendations, the level of consumer participation in a virtual brand community may increase. Therefore, it will be easier to turn the community visitors into members, members into contributors, and contributors into evangelists of the community and the brand around which the community is developed. As a consequence, consumers could develop greater emotional feelings and ties to that brand. In sum, this study draws

attention on the importance of managing virtual brand communities and the interactions among its members in order to increase consumer loyalty, which is a major objective for most of the organizations (Andreassen, 1999).

7.3. Limitations and future research

In spite of the interesting results obtained, we must be careful when extrapolating these findings to other types of virtual brand communities due to the fact that we have only analyzed FS virtual communities. Therefore, to generalize the results, it would be a good idea to repeat this study using other virtual brand communities. Thus, it would be possible to state whether the participation in these brand communities also influences consumer loyalty, which is, as we have mentioned above, a key objective for most of the organizations. These analyses would help to understand the benefits of virtual communities and reveal its real importance for marketers.

A second limitation of the study is the fact that our sample represents only Spanish-speaking members of FS virtual communities. Therefore, it would be useful to replicate the study using a wider sample of consumers representing nationalities from diverse cultures (e.g. Anglo-Saxon, Hispanic, Jewish, African-American, and Asian) in order to generalize the results obtained. At the same time, since there are great differences in offline consumers' behavior depending on their cultural background, it would be interesting to analyze possible differences in the antecedents and consequences of consumers' participation in virtual communities from different cultures.

A third limitation of the study exists because we have not measured real participation behaviors. Therefore, it would be useful to include in the future real usage data in order to validate our participation measure. However, due to the difficulty in measuring real participation behaviors, in this work we have adapted a continuance participation scale from Koh and Kim (2004). Also, our satisfaction measure reflects an overall satisfaction without considering some of the fundamentals of the Expectation-Disconfirmation Theory (e.g. Oliver, 1980). Thus, it would be interesting to conduct a longitudinal study in which we could reflect consumer expectations regarding his/her participation in a virtual community and the perceived outcomes derived from this participation.

Besides, an interesting route to extend this research would be to analyze other effects derived from consumer participation in virtual brand communities. To be precise, it would be very useful to analyze the link between consumer participation in a virtual brand community and other brand-related behaviors such as the intentions to recommend the products/services of the firm/brand around which the community is developed. This positive word-of-mouth would be especially relevant for brands and organizations since fellow consumers are considered more objective information sources (Kozinets, 2002) and therefore, peer recommendations in these communities may affect consumers' behavior.

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Appendix A.

The individual is asked to grade from 1 to 7 their level of agreement or disagreement with the following statements in relation to the selected virtual community.

Identification	
IDENT1	Other community members and I share the same objectives and values.
IDENT2	I see myself as a part of the virtual community.
IDENT3	I am very attached to the virtual community.
Satisfaction	
SAT1	Overall, I am satisfied with my experience in this virtual community.
SAT2	I am sure I made the correct decision in using this virtual community.
SAT3	I have obtained several benefits derived from my participation in this virtual community.
Participation	
PART11	In general, I am very motivated to participate actively in the virtual community activities.
PART12	In general, I use to stimulate our virtual community.
PART13	I usually provide useful information to other community members.
PART14	In general, I posts messages and responses in the community with a great excitement and frequency.
Promotion	
PROMO1	I never miss the opportunity to recommend this virtual community to others.
PROMO2	I always recommend this virtual community when I meet somebody interested in free software.
Loyalty	
LOY1	I have the intention to continue using FS products in the near future.
LOY2	I will actively look for FS products in order to satisfy my needs.
LOY3	I intend to use any FS product.

Note: These scales were presented in Spanish due to the interviewees' nationalities.

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