BEYOND THE CALL OF DUTY:
WHY CUSTOMERS CONTRIBUTE TO FIRM-HOSTED COMMERCIAL ONLINE COMMUNITIES

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Abstract

Firm-hosted commercial online communities, in which customers interact to solve each others' service problems, represent a fascinating context to study the motivations of collective action in the form of knowledge contribution to the community. We extend a model of social capital based on Wasko and Faraj (2005) to incorporate and contrast the direct impact of commitment to both the online community and the host firm, as well as reciprocity, on quality and quantity of knowledge contribution. In addition, we examine the moderating influence of three individual attributes that are particularly relevant to the firm-hosted community context: perceived information value, sportsmanship, and online interaction propensity. We empirically test our framework using self-reported and objective data from 203 members of a firm-hosted technical support community. In addition to several interesting moderating effects, we find that a customer's online interaction propensity, commitment to the community, and the informational value s/he perceives in the community are the strongest drivers of knowledge contribution.

Keywords: collective action, social capital, firm-hosted commercial online communities, online interaction propensity

Introduction

Online communities have an unparalleled ability to facilitate the collective action of knowledge contribution, as evidenced for example in the open source movement (e.g., Lakhani and von Hippel 2003; von Krogh and von Hippel 2003). Even though knowledge, which is the main resource exchanged in online communities, possesses the quality of a public good that can be consumed by anyone (regardless of whether this individual has contributed to its production), a puzzling amount of people forgo the economically rational tendency to free-ride and rather share their knowledge for the good of the collective (Wasko et al. 2004).

An increasing number of firms are now attempting to exploit this phenomenon by hosting online communities for commercial purposes, such as building relationships with their customers, getting their feedback, strengthening the brand, and reducing customer service costs by enabling peer-to-peer problem solving (e.g., Moon and Sproull 2001). The success of these firm-hosted commercial online communities entirely depends on the willingness of customers to spend time and effort responding to each other's requests for help. Given that not only fellow customers, but ultimately also the host firm benefit from the knowledge exchanged in firm-hosted commercial online communities, it is surprising that customers are actually willing to answer "the call of duty" and actively engage in knowledge contribution. Empirical evidence with respect to the predictive ability of antecedents of knowledge contribution has remained equivocal (e.g., Wasko and Faraj 2005). Furthermore, it is not clear whether empirical findings in the emerging literature on open source and practice-oriented online communities (e.g., von Hippel and von Krogh 2003) can be extended to the context of firm-hosted commercial online communities. Thus, there seems to be both a managerial and theoretical need for a more in-depth understanding of the factors that predict customers' contribution to knowledge resources in this context.

Following Wasko and Faraj (2005), we advance theories of collective action and social capital as a theoretical basis for gaining such an understanding. These authors have tested a theoretical framework incorporating individual motivations and social capital to explain voluntary behavior in computer-mediated knowledge exchange networks. As the very existence of companies depends on sound relationships with their customers (e.g., Morgan and Hunt 1994), our focus is on the relational dimension of social capital within the context of firm-hosted commercial online communities. In accordance with Wasko and Faraj (2005), we examine the role of commitment and reciprocity as predictors of knowledge contribution. However, in the case of firm-hosted commercial communities, it remains unclear which object of commitment is most important in driving knowledge contribution behavior. Commitment may not only be directed at the online community, but also at the firm hosting the community. Therefore, we assess how both types of commitment affect the quality and quantity of knowledge contribution.

In addition to the aforementioned relational capital dimensions, Wasko and Faraj (2005) argue that individual attributes of community members impact knowledge contribution in electronic networks of practice. For the context of firm-hosted commercial online communities, we propose three individual attributes pertaining to the message, the medium and the messenger: (1) information value, (2) sportsmanship and (3) online interaction propensity. First, people contribute knowledge in online communities as they expect that "some new value will be created" (Wasko and Faraj 2005: 39). We propose that the availability of valuable content will stimulate community members to contribute. Second, while many companies are experimenting with online communities as an additional service support channel, there is little theoretical and practical guidance on how to develop, manage and improve this online channel. In such a learning-by-doing environment, it seems important that community members display a goodwill tolerating less than ideal circumstances and a

willingness to face inconveniences and tackle challenges. This is reflected in sportsmanship, a form of citizenship behavior. There is accumulating evidence (e.g., Bell and Menguc 2002; Yoon and Suh 2003) that sportsmanship induces customer commitment, compliance to service standards and cooperative behavior in service delivery operations. Third, it has been observed that members of online communities strongly differ in their inclination to interact (Burnett 2000). Often a distinction is made between active contributors and lurkers (Cothrel and Williams 1999). Therefore, we examine the impact of online interaction propensity, or an individual's general tendency to engage in online interactions, on knowledge contribution.

Wasko and Faraj's (2005) study on antecedents of knowledge contribution in electronic networks of practice did not yield a consistent pattern between predictor and criterion variables. Recent theorizing on online behavior has suggested that it may be conceptually relevant to investigate the moderating impact of individual attributes, rather than direct effects (Dabholkar and Bagozzi 2002). This line of reasoning has been substantiated empirically by recent research that shows that people's online behavior may differ as a result of cross-sectional heterogeneity between persons and different commercial contexts (Bucklin and Sismeiro 2003). Therefore, it seems necessary to refine our understanding of drivers of knowledge contribution in firm-hosted online communities by examining the interaction effects between relational capital and individual attributes.

The Collective Action Problem in Firm-Hosted Online Communities

Online communities originally began to form as social entities with the aim of bringing back a sense of belonging that was lost during the shift from community to society (Fischer et al. 1996). More and more private individuals clustered online with similar others to anchor themselves, support each other, and exchange information (Bressler and Grantham 2000). By the mid-1990s, the commercial potential of such online groups was strongly

propagated in the popular management literature (e.g., Hagel and Armstrong 1997), with the result that numerous organizations started to explore the opportunities for building their own online community. These firm-hosted commercial online communities of customers are the research context of this paper. We define commercial online communities as *firm-hosted online aggregations of customers who collectively co-produce and consume content about a commercial activity that is central to their interest by exchanging intangible resources.* These intangible resources can take the form of information, knowledge, socio-emotional support, and the like (Butler et al. 2002).

One of the most common types of firm-hosted commercial online communities is the community for service support (Rainie and Horrigan 2005). As opposed to online brand communities, the main purpose of which is the celebration of the brand and the affiliation with other brand enthusiasts (e.g., Algesheimer et al. 2005), online communities for service support focus on peer-to-peer problem solving and information exchange. In contrast to telephone and on-site support, communities are commonly a free-of-charge support channel that the host firm offers to its customers. Notable examples of firm-hosted service support communities are the Dell, HP, Adobe and iPod (Apple) user communities for technical support, the Lonely Planet and Fodors communities for knowledge exchange concerning all travel-related questions, or Ensemble Studio's Age of Empire community for strategy advice on online gaming.

It is worth noting that firm-hosted commercial online communities are conceptually very different from open source communities, which have received recent research attention in the information systems literature (e.g., Lakhani and von Hippel 2003; von Hippel and von Krogh 2003). Most importantly, open source communities are not explicitly sponsored by companies, but are set up by individuals or small groups as independent software development projects (Moon and Sproull 2000). Hence, open source project participants can

reap direct benefits from their voluntary contributions to the project. Two of the most cited reasons for participation in this type of community are a personal need for the product being developed and the enhancement of career opportunities (Lakhani and von Hippel 2003; von Hippel and von Krogh 2003). In contrast, in commercial online communities members are *customers* of the host company who have paid for ownership of the company's products. Traditionally, one would expect the company to provide a support service to its customers, either free-of-charge or as part of a service contract. In firm-hosted commercial online communities, however, customers not only seek this support service from *other customers*, but they even invest their own time and effort solving fellow customers' problems. As such, members of firm-hosted commercial online communities take over service functions traditionally provided by the host company, oftentimes without getting any monetary compensation or other direct rewards.

While the host company obviously benefits from reduced service costs and other valuable by-products of this customer-to-customer problem solving (e.g., rich customer feedback, relationship building potential, etc.), it is less clear why the host firm's customers are willing to contribute knowledge to these commercial online communities in the absence of obvious direct rewards. After all, the community's resources, which result from the knowledge contribution of its members, have the quality of public goods. Public goods are defined by two characteristics: nonexcludability and nonrivalry (Samuelson 1954). Once made available to one person, public goods can be consumed by all others at no additional marginal costs, without being "used up" (Olson 1965). In addition, individuals cannot be excluded from consuming the public good, even though they might not contribute to its production. Similarly, the knowledge contributed by one online community member is visible and accessible to all other members, regardless of whether they have ever actively contributed anything themselves (Wasko and Faraj 2000; 2005; Wasko et al. 2004). Thus, there is ample

opportunity for members to lurk and free-ride instead of participating in the creation of the community's resources, potentially resulting in underprovision of the public good. This is known as the collective action problem (Olson 1965; Ostrom 2000). Firm-hosted commercial online communities aggravate the collective action problem and therefore represent a particularly interesting context to study knowledge contribution behavior and its drivers. This aggravation stems from the fact that not only fellow customers, but also the host firm can benefit from the public good (i.e., free-of-charge service provision, knowledge about problems with its products and services and associated solutions) created by its customers. Hence, it is our aim in this paper to further our understanding of why customers forgo their apparent inclination to act out of self-interest and contribute knowledge to the firm-hosted commercial online community rather than free-ride on the efforts of others. Our point of departure for gaining such an understanding will be the concept of social capital (e.g., Bourdieu 1986; Coleman 1988; Putnam 1993).

Social Capital and Knowledge Contribution in Firm-Hosted Online Communities

Social capital is an elastic term with a variety of definitions. Generally, it is conceptualized as an intangible resource of support that emanates from membership of a social group which can be mobilized in times of need (Adler and Kwon 2002; Bourdieu 1986; Coleman 1988). Traditional examples of such a resource of support include babysitting clubs and neighborhood watches. The basic premise of social capital is that investment in social relations results in benefits (Coleman 1988). While investments are made by individuals in the collective, the benefits accrue to both the collective as a whole as well as to the individual members (Lin 2001). Consequently, the promise of social capital accumulation enables participants to act together and pursue shared objectives (Putnam 1993). In the case of the neighbourhood watch, for example, the entire neighbourhood benefits every night from

increased security, while each neighbour has to participate only once a week. Thus, social capital operates on the assumption that the total is more than the sum of its parts. However, beyond the basic agreement that social capital resides in social relations, there is considerable debate about whether it stems from the formal structure of these social relations or their content (Adler and Kwon 2002). Whereas the former approach focuses on social network analysis and measures such as centrality, the latter concentrates on the quality of social relations based on trust, norms, and commitment (Nahapiet and Ghoshal 1998; Wasko and Faraj 2005). In addition to this structural and relational dimension of social capital, Nahapiet and Ghoshal (1998) have identified a third, cognitive dimension, which refers to a shared system of meaning within a group, such as a common jargon.

These three dimensions of social capital have been put forward as main drivers of knowledge sharing within organizations (Nahapiet and Ghoshal 1998), based on the reasoning that they create supportive conditions for exchange. Wasko and Faraj (2005) have adopted the same reasoning in an attempt to explain knowledge contribution to electronic networks of practice. However, as opposed to the network level of analysis employed by Nahapiet and Ghoshal (1998), they developed their research model on the *individual level*, arguing that members of electronic networks not only build a relationship with the network as a whole, but also with individuals within the network. As a result, these individual relationships are important sources of social capital and determine how individual members behave in relation to others, for example with regards to knowledge sharing.

Since this is applicable to firm-hosted online communities as well, we adopt the same approach and develop our theorizing on the individual level of analysis. However, we focus primarily on the relational dimension of social capital as a predictor of knowledge contribution, based on the following rationale. First, we have no reasons to suppose that the structural or cognitive dimension would differ in the case of firm-hosted online communities.

A recent study by Tsai (2006) indeed confirms the importance of structural capital in virtual communities. Second, Wasko and Faraj (2005: 51) did not find a consistent positive effect of relational social capital on knowledge sharing between network members, and concluded that "relational capital may not develop in electronic networks due to a lack of shared history, high interdependence, frequent interaction, and co-presence." This result is in contrast to Granovetter's (1973) theory of weak ties, which predicts that knowledge can also be exchanged in loosely knit network structures, and that the information stemming from weak ties might in fact be more valuable. Constant et al. (1996), for example, proposed that electronic weak ties can lead to improved knowledge exchange because more people are reached, their knowledge repositories are more diverse, and they possess more resources. Hence, it seems theoretically relevant to re-examine the influence of relational social capital on knowledge contribution in firm-hosted online communities. Finally, since the main focus of these communities is to develop and maintain relationships with customers, it seems managerially relevant to examine relational capital as a driver of knowledge contribution.

Relational social capital refers to the affective nature of social relationships within a collective (Wasko and Faraj 2005) and has been identified as an important facilitator of an individual's actions within the collective (Coleman 1990). As such, the relational dimension of social capital is expected to have a strong influence on individual member behavior, such as knowledge contribution (Nahapiet and Ghoshal 1998). There are two main aspects of relational social capital. The first is mutual trust that help provided will be returned. This mutual trust arises within the context of regular, cooperative behavior based on commonly shared norms (Paldam and Svendsen 2001). In an online community, this trust facilitates the ease of cooperation by reducing the risk of a one-way knowledge flow in which the knowledge provider would be taken advantage of. The norm of reciprocity specifies that people should help those who have helped them by returning equivalent benefits. Recipients

of beneficial actions feel a sense of indebtedness, which leads to a motivation to alleviate this indebtedness through reciprocation (Gouldner 1960). Previous research has found that the reciprocity norm operates in online settings and is able to motivate knowledge sharing (Wasko and Faraj 2000). Thus, when the individual members of an online community perceive that a strong norm of reciprocity governs the exchanges within the community, they trust that their valuable knowledge contribution will be reciprocated at some point in the future. In line with Wasko and Faraj (2005), we differentiate between the quality and the quantity of knowledge contribution, and derive the following hypotheses:

H1a: An individual's perception of the norm of reciprocity has a positive impact on the quality of her/his knowledge contribution.

H1b: An individual's perception of norm of reciprocity has a positive impact on the quantity of her/his knowledge contribution.

The second aspect of relational social capital is commitment to the collective, which results in a perceived duty to help fellow members of the same collective through knowledge contribution. As members have repeated positive exchange experiences, the importance of the relationship with the community as a whole increases accordingly and members become committed. Kollock (1999) posits that it is this commitment that motivates members to contribute content. When commitment to the community increases, members feel a sense of responsibility to assist others in the collective by sharing their valuable knowledge (Wasko and Faraj 2005). This leads us to propose the following:

H2a: An individual's commitment to the online community has a positive impact on the quality of her/his knowledge contribution.

H2b: An individual's commitment to the online community has a positive impact on the quantity of her/his knowledge contribution.

A unique feature of firm-hosted online communities is that its members not only act out of concern for each other, but potentially also out of concern for the host company. Members of firm-hosted commercial online communities are usually customers of the host firm, which means that they might have established a bond with the firm that is independent from the online community. In most cases, this commitment is motivated by the repeated purchase of and enthusiasm for the firm's products or services. In the literature on brand communities, it has been established that members of these types of communities are not only dedicated to their specific online group, but also the brand and underlying firm (Algesheimer et al. 2005). Hence, it is possible that customers do not only contribute their valuable knowledge to the online community's resources out of concern for the good of the community itself, but because they also treasure their bond with the host firm. Thus, in firm-hosted commercial online communities, an additional driver of knowledge contribution may be the members' commitment to the host firm.

H3a: An individual's commitment to the host firm has a positive impact on the quality of her/his knowledge contribution.

H3b: An individual's commitment to the host firm has a positive impact on the quantity of her/his knowledge contribution.

In addition to social capital, previous research proposes that knowledge contribution is also influenced by individual attributes of network participants (e.g., Nahapiet and Ghoshal 1998; Wasko et al. 2004; Wasko and Faraj 2005). In the next section, we will elaborate on the potential impact of three individual variables that are particularly important in the context of firm-hosted online communities: perceived informational value, sportsmanship, and online interaction propensity. Our full conceptual model is summarized in Figure 1.

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Individual Attributes and Knowledge Contribution in Firm-Hosted Online Communities

Social capital researchers have proposed that one important reason why some individuals build up more social capital and engage more willingly in collective action than others are individual attributes, such as motivations and abilities (Adler and Kwon 2002; Coleman 1990; Lakhani and von Hippel 2003; Nahapiet and Ghoshal 1998, Putnam 1993). Specifically, we propose that three individual attributes pertaining to the message, the medium, and the messenger will influence knowledge contribution in firm-hosted online communities. These attributes are (1) the perceived informational value of the message, i.e., the knowledge exchanged in the community, (2) an individual's level of tolerance of imperfections in the medium, i.e. the online community, expressed by sportsmanship, and (3) online interaction propensity, the messenger's tendency to engage in online interactions.

To our knowledge, studies on knowledge sharing to date have tended to study direct effects of individual attributes (e.g., Constant et al. 1996; Nahapiet and Ghoshal 1998; Wasko and Faraj 2005). Despite convincing hypotheses, several of these direct effects have been found to be insignificant, much to the surprise of the researchers. For example, Wasko and Faraj (2005) did not find a significant relationship between "enjoying helping" and knowledge contribution, and Lakhani and von Hippel (2003) observed that the empirical evidence of a direct relationship between reputational gains and knowledge contribution is fragmented. A possible reason for these inconsistent findings might be that individual attributes exert a moderating rather than direct effect. Nahapiet and Ghoshal (1998: 251) suggest that the process that leads to knowledge contribution is interrelated and complex, and that their own focus on direct effects "limits the richness of the present exploration and

identifies an important area for future work." In general, it has been suggested that focusing on direct effects of individual attributes may be somewhat "redundant and obvious" (Dabholkar and Bagozzi 2002: 186), and that the investigation of moderating effects is much more meaningful (e.g., Ajzen et al. 1982; Baron and Kenny 1986; James and Brett 1984). Therefore, we investigate the impact of *interactions* between an individual's relational social capital and her/his attributes on the level of knowledge contribution. The relevance and moderating effects of perceived informational value, sportsmanship, and online interaction propensity are discussed next.

Moderating Effects of Perceived Informational Value

An important observation that has emerged from social capital research in the context of organizations is that collective action is often driven by instrumental motivations of the individual, such as career advancement (e.g., Lin et al. 1981). Indeed, also in the context of electronic networks of practice and open source communities, prior research indicates that individuals participate out of rather instrumental reasons: access to high-quality information and the opportunity to exchange ideas and solutions (Lakhani and von Hippel 2003; Wasko and Faraj 2000; Wasko et al. 2004). Nahapiet and Ghoshal (1998) already suggested that individuals will only contribute knowledge if they expect that this action will create value for the collective, with the anticipation of personally benefiting from this value in the future. In a professional environment such as a firm-hosted online community, the main source of value that accumulates in the collective and accrues to the individual is information. Customers visit the firm-hosted community first and foremost because they have an information need and hope to get answers from fellow customers. Thus, the perceived level of the informational value that the community provides is an important individual attribute that clearly will have an effect on the relationship between relational social capital and knowledge contribution.

More specifically, we expect that higher levels of perceived informational value will strengthen the relationship between reciprocity and knowledge contribution. Even though the norm of reciprocity is universal (i.e., prevalent in all groups to which an individual belongs), it is not unconditional (Gouldner, 1960). Rather, the intensity of the norm is "contingent upon the imputed *value* of the benefit previously received" (Gouldner 1960: 171). Hence, if a member of a firm-hosted online community perceives the information provided to her/him by other community members to be valuable, the indebtedness towards the community and consequently her/his desire to reciprocate and contribute knowledge will increase. Therefore, we propose the following hypotheses:

H4a: If an individual's perception of the community's informational value increases, the relationship between reciprocity and the quality of her/his knowledge contribution will be strengthened.

H4b: If an individual's perception of the community's informational value increases, the relationship between reciprocity and the quantity of her/his knowledge contribution will be strengthened.

In addition, perceived informational value may also have an impact on the relationship between an individual's commitment to the online community and knowledge contribution. A committed community member feels a sense of responsibility towards the collective and therefore assists other members. Commitment builds over repeated interactions with others (Coleman 1990; Nahapiet and Ghoshal 1998; Wasko and Faraj 2005). We expect that the value of these repeated interactions will have an effect on how obliged an individual feels to "pay back" the collective by contributing her/his knowledge:

H4c: If an individual's perception of the community's informational value increases, the relationship between commitment to the community and the quality of her/his knowledge contribution will be strengthened.

H4d: If an individual's perception of the community's informational value increases, the relationship between commitment to the community and the quantity of her/his knowledge contribution will be strengthened.

As stated before, members of firm-hosted online communities might not only be committed to the community itself, but also to the underlying company that hosts it, based on previous experiences with its products and services. There is evidence that the impact of commitment on customer behavioral intentions is enhanced by value perceptions (Pura 2005). Since the members of such a community are customers of the host firm who come to the community with problems related to those products and services, the online community in fact acts as service support channel. If this support channel provides valuable information to the customer – and thus a valuable service – s/he might feel that the host firm has fulfilled its obligations and it is now her/his turn to contribute to the continued success of the online community as a service channel by sharing her/his knowledge. This leads to the following hypotheses:

H4e: If an individual's perception of the community's informational value increases, the relationship between commitment to the host firm and the quality of her/his knowledge contribution will be strengthened.

H4f: If an individual's perception of the community's informational value increases, the relationship between commitment to the host firm and the quantity of her/his knowledge contribution will be strengthened.

Moderating Effects of Sportsmanship

An attribute that is of particular importance in the context of firm-hosted online communities is an individual's level of sportsmanship. Sportsmanship has its roots in organizational theory and is one of the original dimensions of organizational citizenship behavior (Organ 1988). It is defined as "the willingness to tolerate less than ideal circumstance without complaining" (Podsakoff et al. 1997: 263), and has been demonstrated to have a beneficial effect on cooperative behavior (e.g., Bell and Menguc 2002). In firm-hosted online communities, "less than ideal circumstances" might arise from two different sources. On the one hand, since online communities are computer-mediated and depend entirely on information technologies, technical problems, for example with the web server, as well as design and functionality issues might cause annoyance to community members. On the other hand, the community members themselves might create imperfections, for example by behaving inappropriately, or unintentionally providing incorrect answers to service queries.

Higher levels of sportsmanship provide a shield against the potential negative consequences of such imperfections, and as such strengthen the effects of relational social capital on knowledge contribution. Even if a community member desires to reciprocate help received, a technical breakdown or inappropriate member behavior might deter her/him from participating if s/he has a low level of tolerance for such problems. If, however, the member displays high sportsmanship, s/he might be more willing to overlook these problems or see them as improvement opportunities and continue trying to make helpful contribution. Consequently, we suggest the following hypotheses:

H5a: If an individual's level of sportsmanship increases, the relationship between reciprocity and the quality of her/his knowledge contribution will be strengthened.

H5b: If an individual's level of sportsmanship increases, the relationship between reciprocity and the quantity of her/his knowledge contribution will be strengthened.

A similar reasoning applies to the effect of sportsmanship on the relationship between commitment to the online community as well as the host firm and knowledge contribution. If the repeated interactions between online community members are continuously disrupted or otherwise negatively impacted by technical problems or inappropriate member behavior, the feeling of responsibility towards the community and consequently knowledge contribution would decline. Sportsmanship provides a defence mechanism against such a chain of events. Community members who display high sportsmanship are more willing to tolerate these negative aspects of the community and continue to assist fellow members. Thus, we hypothesize:

H5c: If an individual's level of sportsmanship increases, the relationship between commitment to the community and the quality of her/his knowledge contribution will be strengthened.

H5d: If an individual's level of sportsmanship increases, the relationship between commitment to the community and the quantity of her/his knowledge contribution will be strengthened.

In relation to the interaction between commitment to the company and sportsmanship, Mattila (2004) demonstrates that the negative impact of service failures on customer-perceived commitment is less pronounced for those customers who exhibit higher levels of failure tolerance. Since a firm-hosted online community has the function of a service channel, its members might be less forgiving of imperfections than they would be in other contexts.

After all, they are customers who have paid money for ownership of the firms' products or services that lie at the heart of the community. Often, the online community is the only free-of-charge support option available to them, and they might not easily forgive problems with elements that the host firm controls, such as design, functionality, and other technical issues. If the quality of the service support provided by the community suffers as a result of such imperfections, the customer's bond the host firm might be negatively affected, hand in hand with her/his willingness to continue investing in the community through knowledge contribution. As a result, the level of sportsmanship will be crucial in determining the amount of damage caused. More specifically, we expect the following:

H5e: If an individual's level of sportsmanship increases, the relationship between commitment to the host firm and the quality of her/his knowledge contribution will be strengthened.

H5f: If an individual's level of sportsmanship increases, the relationship between commitment to the host firm and the quantity of her/his knowledge contribution will be strengthened.

Moderating Effects of Online Interaction Propensity

Interaction is a precondition for the development and maintenance of dense social capital (Bourdieu 1986), and in firm-hosted commercial online communities, interaction takes place through asynchronous computer-mediated communication. Knowledge contribution should therefore be strongly influenced by an individual's willingness to engage in such online interactions. However, despite its apparent importance, this crucial individual attribute has received no previous research attention to our knowledge.

It is a common observation in online communities that members strongly differ in their interaction frequency (e.g., Burnett 2000; Hammond 2000). For example, Hammond

(2000) concludes from his qualitative work that there are two types of membership in online groups: communicative membership, in which individuals interact frequently, articulate concerns, and respond to messages; and quiet membership, in which individuals read messages but rarely send/post messages of their own. Based on a review of the communication literature, we propose that the type of membership that an individual displays may be explained in part by the presence (or lack) of a general disposition to engage in online interactions. In the traditional communication and psychology disciplines, which deal with face-to-face interactions, it is well known that individuals have different propensities to communicate with others (Liu 2003). This personality trait has been called "(un)willingness to communicate" and describes a general tendency to approach or avoid communication (Burgoon 1976; McCroskey and Richmond 1985). But as all interaction on the Internet is mediated by technology, it is profoundly different from face-to-face communication (e.g., Hoffman and Novak 1996). Online interactions are mostly asynchronous, text-based, and lack both verbal and especially non-verbal cues. In addition, due to the truly global nature of the Internet, a large percentage of online interactions occur between relative strangers. Many people who communicate with each other online have never personally met, and postings on newsgroups, discussion boards, and in online communities can have potentially global audiences.

Due to these fundamental differences between offline and online communication, it is not suitable to simply transfer an offline communication trait and apply it to the online context. Rather, it seems necessary to investigate online interactions separately. Most research on the Internet has overlooked the existence of individual differences in online interaction preference (Liu 2003). In order to overcome this shortcoming, we propose a new behavioral disposition – *online interaction propensity* – that we define as *a prevailing tendency of an individual to interact with relative strangers (i.e., people they have never met offline) in an*

online environment. It is this behavioral disposition, rooted in personality, that explains why one person will engage in online interaction and another will not under identical circumstances.

The literature on norm theory alludes to the fact that the strength of the relationship between norms and resulting action is influenced by the presence of certain conditions that are conducive to the activation of norms (Schwartz 1977). Schwartz (1977) proposes that the norm-behavior link is often influenced by personality moderators. Likewise, Ostrom (2000) argues that the development of a theory of collective knowledge sharing must take personality traits into account. An important condition for the activation of norms is the inclination of members to communicate with other members. By engaging in community discussions and knowledge sharing, the communicative members become more aware of the norms that govern the community, making them in turn a more powerful predictor of knowledge contribution. Thus, we put forward the following hypotheses:

H6a: If an individual's level of online interaction propensity increases, the relationship between reciprocity and the quality of her/his knowledge contribution will be strengthened.

H6b: If an individual's level of online interaction propensity increases, the relationship between reciprocity and the quantity of her/his knowledge contribution will be strengthened.

In addition, we also expect a moderating effect of online interaction propensity on the relationship between commitment to the online community and knowledge contribution. As mentioned before, commitment to a collective is built through repeated interactions with its members (Nahapiet and Ghoshal 1998). Since interactions in online communities are computer-mediated, their frequency will be impacted by an individual's tendency to engage in

such online interactions. An online interaction prone individual will communicate more frequently and build stronger relationships with her/his fellow community members and the collective as a whole. Moreover, these frequent interactions will likely strengthen her/his feelings of obligation to provide help to fellow members by contributing knowledge. We therefore propose:

H6c: If an individual's level of online interaction propensity increases, the relationship between commitment to the community and the quality of her/his knowledge contribution will be strengthened.

H6d: If an individual's level of online interaction propensity increases, the relationship between commitment to the community and the quantity of her/his knowledge contribution will be strengthened.

It has been argued that the communicative interplay between companies and their customers plays a central role in forging relational bonds (Ford 2001). Repeated interactions between company representatives and customers, for instance, result in more favorable behavioral intentions towards the firm on the part of the customer (Gutek 1995). A firm-hosted online community is often managed by employees of the firm, and customers interacting with other customers in the community know that they are being "watched" by the firm. Thus, they might perceive customer-to-customer interactions as an indirect communication with the host firm. As community members who are more inclined to interact online are more likely to experience repeated interactions with firm representatives and other customers, we predict that the influence of commitment to the host firm on knowledge contribution in online communities will increase as a result of this disposition.

H6e: If an individual's level of online interaction propensity increases, the relationship between commitment to the host firm and the quality of her/his knowledge contribution will be strengthened.

H6f: If an individual's level of online interaction propensity increases, the relationship between commitment to the host firm and the quantity of her/his knowledge contribution will be strengthened.

Methodology

Research Setting

In order to empirically test our hypotheses, we conducted a quantitative study among the members of an online technical support community hosted and moderated by a large computer hard- and software supplier. The primary commercial benefit of this online community is service cost reduction, and to a lesser extent brand building and "listening in." The community is available on a world-wide basis, and the language for content is English. Furthermore, it is entirely based on asynchronous discussion boards. Hence, information exchange is not "real time", although most posts receive a reaction within minutes. All member-generated content is stored and, due to a powerful search engine, easily accessible at all times. As a free-of-charge technical support service, the community is accessible to all of the hosting firm's customers, but its main users are IT professionals. It is worth noting, though, that the community does not exclusively operate in a business-to-business context. The hosting firm estimates that at least 25% of the community's members are non-IT professionals. The goal of the community is to provide a platform where like-minded IT enthusiasts – regardless of whether they are business customers or consumers – can interact and engage in peer-to-peer technical support and knowledge sharing. Consequently, the

majority of member interaction focuses on information exchange about technical problems. The value of this information exchange is demonstrated by the hosting firm's estimate that at least 35% of the problems posted in this online community are completely solved by other members. In addition, members also converse about social topics, which range from exchanging system-administrator jokes to discussing the isolation and frustration that some experience at their workplace. A unique feature of this community is that it provides a member-controlled point reward system. Points (ranging from 0 to 10) can be assigned by the member who posted a question based on the *quality* of the answers received. When a member has collected a certain number of points, s/he receives a "hat" that appears next to her/his username. There are six levels of hats: "Pro," "Graduate," "Wizard," "Royalty," "Pharaoh," and "Olympian." As such, these hats are an indication of the quality of the knowledge contributions that an individual member provides.

As mentioned before, the online community is moderated by employees of the hosting firm. These moderators are clearly visible since the company logo is placed next to their name. They practice a "hands off" approach and usually do not answer technical questions. Their role is to facilitate member interactions, and as such, they mainly guide new members and gather feedback from existing ones. They only interfere in the discussions if members display disruptive behaviors, as outlined in a community "code of conduct." In addition to the moderators, also other employees of the host firm participate in the community, but they do so on a completely voluntary basis and behave like other members. While the host firm logo also appears next to their name, they do collect points and associated hats like all other members. In order to use the online technical support community, members have to register to the site by choosing a user name and password. In this process, an accurate email address has to be provided, but the hosting firm commits to not use or disclose this email address without the consent of the member. Hence, real names and email addresses are not visible online

unless the member chooses to disclose them. While several thousand people have at some point registered for the community, the hosting organization estimates that there are roughly 750 active members who regularly spend several hours per week in the online community.

Questionnaire development

All latent variables are measured using a multiple-item measurement scale. These measures use a seven-point Likert type response format, with "strongly disagree" and "strongly agree" as the anchors. Except for online interaction propensity, we only used scales that have been validated by previous empirical research. Items were selected and adapted to the specific characteristics of our research setting on the basis of interviews with four members and four managers of a different online community (which is part of a professional career site and focuses on the exchange of advice concerning job search). The resulting questionnaire was pretested quantitatively on a sample of 85 community members. As a consequence, several items were reworded or deleted.

In addition, we had to develop a scale for the individual difference variable "online interaction propensity." We followed the procedure proposed by Churchill (1979) and conducted in total two qualitative and four quantitative studies (each using a different sample) to develop and validate a scale. In the two qualitative studies (conducted at two different firms), we extensively interviewed in total 14 e-business managers and eight online community members to establish the domain of our construct and generated an initial pool of 54 items. We then asked five academic experts and three e-business managers to rate how well each item represents online interaction propensity. Only the 30 most representative items were retained for further quantitative analysis. In the first quantitative study, using an offline student sample (n = 287), we reduced the scale to eight items by randomly splitting the sample in half and using exploratory and confirmatory factor analysis. In the following study,

using a second offline student sample (n = 308), we evaluated discriminant validity by assessing the final eight-item scale together with conceptually close constructs (i.e., extraversion, offline willingness to communicate, and involvement with online communication) and controlling for social desirability bias. Next, we established nomonological validity in the fifth study (n = 195) by demonstrating the ability of the online interaction propensity scale to explain self-reported communication behavior in an online technical support community setting. In the final study, we administered the online interaction propensity scale to 50 members of an online movie review community and independently collected the actual number of postings during a four-week period before the administration of the scale, and found that online interaction propensity is indeed significantly correlated with actual online interaction behavior.

Measures

We measured the study variables through both self-reported survey data and objective participation data. Sportsmanship is measured with four items adapted from Podsakoff et al. (1997). Commitment to the community and commitment to the host firm are both measured with three items each, adapted from Morgan and Hunt (1994). Informational value is measured by three items based on Okleshen and Grossbart (1998), and reciprocity by three items based on de Ruyter and Wetzels (2000) and Wasko and Faraj (2000). Finally, the online interaction propensity scale consists of eight newly developed items. The complete set of items is provided in the appendix.

The quality of the knowledge contributions provided by a respondent was assessed by recording the "hat" that s/he had earned (ranging from "No hat" to "Olympian") right after the survey data collection had been completed. Finally, the quantity of knowledge contribution was measured by collecting the number of messages that each respondent had posted during a

one-month period prior to our data collection. In line with Wasko and Faraj (2005), we define knowledge contribution as a response to a question. To ensure that only these kinds of messages were included in our data set, we conducted a content analysis on all messages and classified them into questions of a social nature, answers of a social nature, questions of a technical nature, and answers of a technical nature. In total, 3349 posts were analyzed, of which 0.2% were social questions, 6.9% were social answers, 4.4% were technical questions, and 88.5% were technical answers. Only the latter category (i.e., 2966 messages) was included in the data analysis. One author analyzed all messages, while the second author independently coded a subset of 200 messages. There was an agreement on all 200 messages.

Data Collection

Due to the unavailability of personal email of the online community members, a link to the online questionnaire was posted in a discussion thread in the forum about "general matters." We introduced ourselves as independent researchers, explained the purpose of the study, and invited online community members to participate. In order to stimulate response, we promised to make the results of the survey available by posting them in the community. Employees of the host firm were not invited to participate. In total, we received 216 usable responses. As we do not know how many community members have read the thread featuring our survey, but decided not to respond, we cannot estimate a precise response rate. The only possible measure of response rate is the number of completed surveys per number of unique clicks on the link to the questionnaire (Ridings et al. 2002). The rate of completions per unique visit to the questionnaire was 86%. In order to avoid double entries, date and time of completion, as well as the remote user name were captured. In addition, respondents were asked to voluntarily indicate their community user name and email addresses. In total, 203 respondents were willing to share their user name, which we then cross-checked with the

existing registration profiles. As such, we could ensure that these 203 respondents are indeed members of the online technical support community.

Sample Profile

The 203 respondents we considered in our analysis are predominantly male (92.5%) and relatively young (71.5% below 45 years), which is not surprising in the IT industry. They live in 33 different countries, but most respondents come from the US (40%) and the UK (10%). The majority (68%) have been members in this online community for more than one year, and respondents spend on average 5.5 hours per week in the community. Eighty-nine respondents have not yet earned a "hat," 50 are "Pros," 23 are "Graduates," 27 are "Wizards," nine are "Royalties," three are "Pharaohs", and two are "Olympians." They estimate that 67.2% of the problems they post in the community are completely solved, which is much higher than estimated by the hosting firm. Finally, we were able to not only capture very active participants in our sample, but also the so-called "lurkers," who only read the online community dialogue without contributing. Overall, 16.7% of our respondents self-reported that they have not yet posted anything on the discussion boards, and our analysis of posting frequency indicates that 34% did not post anything during the month prior to our data collection. The majority of respondents (62.1%) posted less than ten technical answers during this month, whereas 10% contributed more than 40 technical answers. The average amount of technical answer posts was 15.74, with a standard deviation of 28.21.

In order to ensure that we do not have a significant response bias in our sample, we randomly selected 100 members of the community who did not respond to our survey and analyzed their posting behavior according to the same procedure used for the respondents. The average amount of technical answer posts in the same time period from these non-respondents was 16.10, with a standard deviation of 29.46. Therefore, we can conclude that at

least in terms of our focal variable knowledge contribution, our sample is not significantly different from the non-respondents.

Results

Validation of Measures

We initially examined the psychometric properties of the administered scales by conducting exploratory factor analysis. The exploratory factor analysis (using principle axis factoring with varimax rotation) found an eight-factor solution that explains 73.1% of the total variance. The eight factors correspond almost exactly to the eight constructs investigated in our study. After inspection of the individual item loadings, we deleted three OIP items and one sportsmanship item with loadings lower than .70 and one OIP item with significant cross-loadings from further analysis, as indicated in Table 1.

PLEASE INSERT TABLE 1 ABOUT HERE

We employed partial least squares (PLS) path analysis as implemented in PLS-Graph version 3.0 (Build 1060) to estimate the parameters in the structural and measurement part of the structural model presented in Figure 1 (Chin, 1998). PLS has been widely used in marketing (e.g., White et al. 2003), information systems (e.g., Wasko and Faraj 2005), and strategic management (e.g., Hulland 1999). As opposed to the covariance-based approach to structural equation modeling (e.g., LISREL, EQS, Mplus, etc.), PLS path modeling is component-based and therefore requires less stringent assumptions in terms of multivariate normality, measurement levels of the manifest variables, and sample size (Chin 1998; Falk and Miller 1992; Hulland 1999; Tenenhaus et al. 2005). Furthermore, Chin et al. (2003) find that PLS path modeling might be superior to moderated regression analysis and covariance-based methods for testing moderating hypotheses.

In our study, we specify reflective indicators (Chin 1998) for all our constructs except for quality and quantity of knowledge contribution which are represented by single indicators. To assess the psychometric properties of the measurement instrument, we specify a null model with no structural relationships. All remaining items have standardized loadings that exceed the recommended cut-off of .70 (Hulland, 1999). We evaluate reliability by means of composite scale reliability (CR) and average variance extracted (AVE) (Chin 1998; Fornell and Larcker 1981). For all measures, the CR is well above the cut-off value of .70, and the AVE exceeds the .50 cut-off value (Fornell and Larcker 1981).

Discriminant validity of the measures can be assessed using multiple methods. First of all, a construct should share more variance with its measures than it shares with other constructs in the model (Chin 1998; Howell and Aviolo 1993), so the square root of the AVE should exceed the intercorrelations of the construct with the other constructs in the model (Fornell and Larcker 1981). In our study, none of the intercorrelations of the constructs exceed the square root of the AVE of the constructs. Moreover, we inspect the Theta matrix (Θ) and confirm that no item cross-loads higher on another construct than it does on its associated construct (Chin 1998) and that the correlations of the residual terms across blocks do not exceed |.20| (Falk and Miller 1992). Consequently, we conclude that all constructs exhibit satisfactory discriminant validity. Table 2a provides the mean, standard deviation, range, CR, and AVE, while Table 2b presents the correlations between all latent variables and the interaction terms.

PLEASE INSERT TABLE 2a AND 2b ABOUT HERE

Hypothesis Testing

We use PLS path modeling to estimate both the direct and the interaction effects in our model (see Figure 1). To test the 18 moderating hypotheses, we resort to the two-step score

construction procedure (Chin et al. 2003). PLS allows for explicit estimation of latent variable (LV) scores, and after saving the standardized LV scores (cf. Tenenhaus et al. 2005), we calculate the interaction terms and include them in the model. This method enables us to test for a relatively large number of interaction effects while simultaneously correcting for measurement error (Chin et al. 2003). To test the effects and statistical significance of the parameters in the structural model, we use a bootstrapping procedure with 1000 resamples and construct-level correction (Chin 1998). As suggested by Chin et al. (2003), we employ a hierarchical approach to test our hypotheses, in which we first estimate a model with the direct effects (Model M1 and M2) only and then add the interaction effects in model M3. We obtain the estimates that we report next from the final model that includes the interaction effects. Table 3 summarizes our results.

PLEASE INSERT TABLE 3 ABOUT HERE

At a significance level (α) of .05 (one-tailed), our results reveal that reciprocity does not have a significant effect on neither quality nor quantity of knowledge contribution. Hence, we do not find support for hypotheses 1a and 1b. As expected, we do find a positive and significant effect for commitment to the community on both quality (β = .131) and quantity (β = .141) of knowledge contribution, in support of hypotheses 2a and 2b. Surprisingly, commitment to the host firm has a relatively weak, but significant negative impact on the quality of knowledge contribution (β = -.091), and no impact on quantity. So while the effect for hypothesis 3a is significant, the direction of the effect does not correspond with the hypothesis. In addition, hypothesis 3b is not supported.

With regard to the moderating hypotheses, we find that hypotheses 4a to 5f are not supported, with the exception of hypothesis 5e. The relationship between relational social capital and knowledge contribution does not seem to be moderated by perceived informational value and sportsmanship, except for the unexpected negative relationship

between commitment to the host firm and the quality of knowledge contribution, which is attenuated for higher levels of sportsmanship (β = .138). However, perceived informational value has a direct effect on the quantity of knowledge contribution (β = .119), which we did not hypothesize. Furthermore, in support of hypotheses 6c and 6d, OIP strengthens the relationship between commitment to the community and both quality (β = .155) and quantity (β = .245) of knowledge contribution. Hypotheses 6a, 6b, 6e, and 6f are not supported. However, online interaction propensity has strong un-hypothesized direct effects on quality (β = .225) and quantity (β = .455) of knowledge contribution. Finally, we also find – contrary to our hypothesizing – that reciprocity acts as a moderator and strengthens the positive direct effect of OIP on the quantity (β = .202) of knowledge contribution.

The R^2 for in the final model M3 (including both main and interaction effects) is .216 for quality and .619 for quantity. Using an incremental F test to test M3 versus the main effects model M2 (Chin et al. 2003; Pedhazur 1997), we find that the ΔR^2 of .086 ($F(9,187) = 2.438$ [$p = .012$]) for quality and ΔR^2 of .128 ($F(9,187) = 7.466$ [$p < .001$]) for quantity is statistically significant. We calculate f^2 to assess the effect size of the interaction terms in the final model (Chin et al. 2003; Cohen 1988), and the results suggest a medium effect size for quality ($f^2 = .099$) and quantity ($f^2 = .251$). Although PLS path modeling includes no proper single goodness-of-fit measure, such as the χ^2 statistic and its derived measures for covariance-based SEM, the R^2 values of the endogenous constructs can be used to assess model fit (Chin 1998; Tenenhaus et al. 2005). In accordance with the categorization of R^2 effect sizes by Cohen (1998; small: .02; medium: .13; large: .26), we conclude that these effect sizes are medium for quality (M3: $R^2 = .216$) and large for quantity (M3: $R^2 = .619$). Finally, Tenenhaus et al. (2005) recently have developed a global fit measure (GoF=√(average R^2 * average AVE)) for PLS, and the goodness of fit in model M3 is .586 (M2: GoF = .505; see Table 3). Assuming a large average effect size for R^2 (.26) and a cut-off

value of average AVE of .70, we would obtain a comparison value for GoF of .42, which both the GoF for M2 and M3 exceed.

Discussion

The aim of this study was to identify the unique drivers of knowledge contribution by customers in firm-hosted commercial online communities. To that end, we extended and empirically tested a model of social capital based on Wasko and Faraj (2005). Given our unique research context, we focused our model on the relationship between the relational dimension of social capital and knowledge contribution, and then investigated the moderating effects of individual attributes on that relationship. Our results clearly indicate that it is worthwhile to consider these interaction effects, as evidenced by the significant improvement in the R^2 of both quality and quantity of knowledge contribution when the interaction terms are added.

Contrary to our expectations, reciprocity did not have a significant effect on quality or quantity of knowledge contribution. This finding is surprising given the reported strength of the reciprocity norm in face-to-face contexts (e.g., Gouldner 1960), and the fact that we did find a significant positive bivariate correlation between reciprocity and the quantity of knowledge contribution. Since there is no multicollinearity between the latent variables in our model, we carried out additional analyses that indicate that online interaction propensity acts as a suppressor. We investigated the suppressor effect by adding independent variables to the model and investigating whether each addition affected the strength of the path from reciprocity to the dependent variable. We found that reciprocity does have a significant impact on the quantity of knowledge contribution until online interaction propensity is added to the model. One potential explanation for this finding might be that interaction is the currency of reciprocity in online contexts. If a community member wants to reciprocate help

received, s/he has to interact with others by responding to requests for support. Thus, the online interaction propensity of this member might overpower her/his reciprocity intentions.

Furthermore, contrary to Wasko and Faraj's (2005) findings, customers who are committed to the firm-hosted online community contribute knowledge more frequently and provide more helpful answers. This indicates that even though members in firm-hosted online communities do not know each other offline, and the community operates in a commercial context, strong relationships between individual members and to the collective as a whole develop. As a result, customers feel a relational bond with the community that encourages them to assist fellow customers and to share their knowledge. This is even more so the case if the customer is online interaction prone, emphasizing again that commitment in online communities is formed over repeated computer-mediated interactions. Even though we did not hypothesize these relationships, online interaction propensity (OIP) also has very strong direct effects on both quantity and quality of knowledge contribution. We can, therefore, conclude that because knowledge contributions in online communities have to be made via online interactions, OIP is an important individual attribute that should be taken into account in assessments of online community members' participation behavior.

Another un-hypothesized result that deserves highlighting is the fact that the direct link between OIP and the quantity of knowledge contribution is strengthened by higher levels of reciprocity. Thus, reciprocity does not have a direct but a moderating effect on knowledge contribution. An individual who would generally prefer not to engage in online interactions might overcome this inclination and contribute knowledge to the community out of a strong feeling of indebtedness and desire to reciprocate.

Contrary to our expectations, commitment to the host firm does not impact the quantity of knowledge contribution, and *negatively* affects the quality of contributions. Since the firm-hosted online community in fact represents an important service channel, we had

expected that customers may be motivated to contribute to the success of this channel through their participation because of the bond they have established with the host firm. However, our results indicate that the opposite seems to be the case: being committed to the host firm leads customers to make lower quality contributions. A possible explanation for his unexpected finding pertains to the firm-hosted community's function as a service channel. Compared to other service alternatives, such as telephone or on-site support, the community requires the customer to make more effort and participate actively in the service provision. A customer who is very committed to the host firm and its products and services might expect "better treatment" than that, and in fact expect the host firm to provide the service, rather than fellow customers. As a result, s/he is not willing to make effort in the community and provide high quality answers. However, the more tolerant the customer is of imperfections in the community, the weaker this negative relationship becomes. We can therefore conclude that if the customer displays high levels of sportsmanship and does not pay attention to minor problems in the community, s/he is also more wiling to make effort and contribute helpful answers.

It is also worth noting that sportsmanship does not affect the relationship between commitment to the online community and knowledge contribution. It seems clear that customers consider the community to be a social entity of its own, and therefore do not attribute any problems in the community to that entity, but rather to the host company. Therefore, their tolerance of imperfections in the community does not have an impact on their relationship with and behavior in the community.

Finally, we had also expected moderating effects of perceived informational value on the relationship between relational social capital and knowledge contribution, based on the argument that the more valuable information a customer receives from the community, the stronger will be her/his feeling of indebtedness and hence obligation to reciprocate this help

and assist fellow members. However, we only found a direct effect from perceived informational value on the quantity of knowledge contribution. This finding highlights the importance of instrumental motivations – such as information need – to participate in online communities (e.g., Wasko and Faraj 2000; Wasko et al. 2004), and mirrors conclusions drawn from open source communities (e.g., Lakhani and von Hippl 2003).

Our results have several interesting implications for firms that host commercial online communities for their customers. Most importantly, firms need to understand that their online communities must and will develop a life of their own. The finding that commitment to the firm has no impact on the quantity of knowledge contribution indicates that the social group dynamics of the community dominate any other influences. The host firm needs to respect that and make sure that it keeps interference to a minimum. Furthermore, it also has to be aware that the community has its limitations as a service support channel. Customers who are highly committed to the host firm in fact expect the host firm and not fellow customers to provide them with service, resulting in an unwillingness to provide quality contributions to the community. This finding re-emphasizes the need for firms to offer a portfolio of service delivery channels that allows customers to choose a service option that is best suited to their individual requirements. Finally, it is also important for firms hosting a commercial online community to realize the importance of individual traits that affect customer behavior, such as online interaction propensity. For example, a certain percentage of members, those who have a low online interaction propensity, may never become active contributing members. It might be worthwhile to attempt identifying the level of online interaction propensity upon registration to the online community in order to better understand subsequent communication activity. Also, as reciprocity increases the impact of OIP, an explicit code of conduct emphasizing this social norm may stimulate members to contribute actively.

Our findings can only be interpreted in the light of certain limitations. While we have focused on the relational dimension of social capital and three individual attributes that seem particularly important in the context of firm-hosted online communities, the structural and cognitive dimensions of social capital and other individual difference variables are clearly important in studying knowledge contribution. For example, several researchers have alluded to the role of generalized trust and identification with the group (e.g., Ridings and Gefen 2002) and expertise and intrinsic enjoyment of the participant on her/his interaction behavior (Wasko et al. 2004). Even though our study clearly underlines the importance of studying moderating effects, we did not find a consistent pattern between independent and moderator variables. The exact nature of the influence of social capital dimensions and individual attributes on knowledge contribution should therefore be investigated in future research. Moreover, we focused our model only on one type of collective action – knowledge contribution. While this is arguably one of the most important drivers of the success of a firm-hosted commercial online community, other types of collective action pertaining to socially oriented goals might also be interesting to investigate. Furthermore, the generalizability of our results may be limited to firm-hosted commercial online communities whose main purpose is service support. Whereas we do think that the findings from the technical support community that we investigated will essentially apply to all customer-to-customer problem solving communities, it might be interesting to also study brand communities, the other important category of firm-hosted commercial online communities. In addition, all concepts and relationships were only measured once, thus essentially from a static perspective. Therefore, we cannot investigate any feedback loops. For example, we would expect that knowledge contribution feeds back to relational social capital as well as informational value, but given the cross-sectional nature of our data, we are unable to test this. Finally, we should also note that we collected our dependent variables prior to our independent variables, but given the

short time that elapsed between the two data collections, this should not have impacted our results.

In conclusion, we have investigated the influence of relational social capital on knowledge contribution of customers in firm-hosted online communities, and paid particular attention to the potential moderating effects of individual attributes. The overall picture that emerges from our results is that knowledge contribution is most strongly influenced by a customer's online interaction propensity, commitment to the community, and the informational value s/he perceives in the community.

Figure 1 Conceptual Model

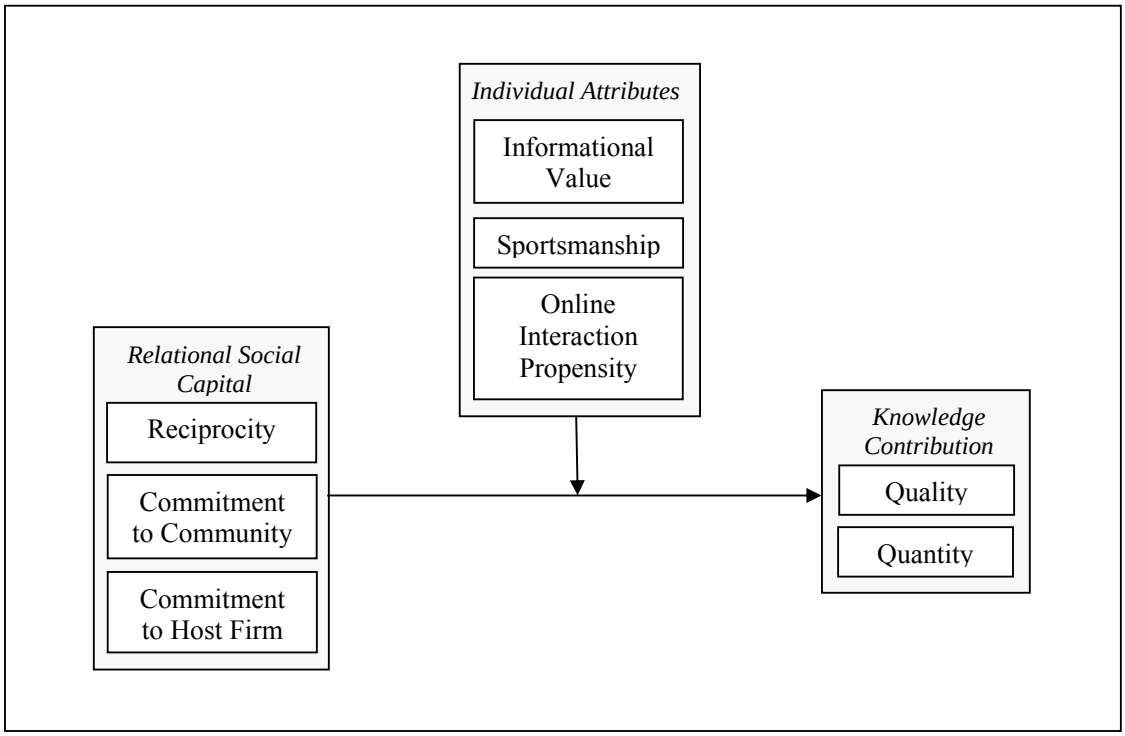

Table 1 Exploratory Factor Analysis Results

Item[a]	Factor							
	1	2	34	4	5	6	7	8
OIP4	.886	.076	.073	.025	-.053	.045	.001	-.035
OIP 5	.862	.133	.098	.003	-.009	.052	.061	-.094
OIP 6	.840	.151	.090	.038	.024	.077	.038	-.129
OIP 3	.829	.191	.107	-.062	-.002	.037	.108	.147
OIP 2*	.798*	.068	.063	.006	-.014	.047	.092	.496**
OIP 8**	.644**	.224	.045	.032	.034	.090	.035	-.028
OIP 1**	.622**	.183	-.009	-.133	-.023	.018	-.026	.195
OIP 7**	.618**	.157	.117	.098	.042	-.033	.138	-.150
Quantity	.551	.212	.245	-.073	-.012	.166	.400	.026
CCOM2	.333	.885	.133	.043	-.025	.019	.108	.004
CCOM3	.320	.878	.112	.024	-.054	.015	.054	.007
CCOM1	.344	.874	.112	.031	-.036	.015	.062	.006
REC2	.121	.096	.921	.026	.007	.122	-.006	.036
REC 3	.193	.077	.891	.019	.020	.058	.061	.022
REC 1	.101	.143	.846	-.073	-.040	.139	.023	=.060
CHOST2	-.016	.018	.026	.922	-.060	.043	.001	-.012
CHOST 3	-.037	-.048	-.022	.901	-.091	.042	-.059	-.021
CHOST 1	.049	.088	-.023	.753	-.105	-.009	-.016	.018
SP1	-.032	-.074	-.018	-.043	.800	-.004	-.006	.003
SP3	-.028	.011	-.043	.025	.759	.040	.007	.026
SP2	.120	.002	.020	-.091	.713	-.009	-.030	.011
SP4**	-.041	-.015	.023	-.096	.487**	.050	-.019	-.037
IV2	.168	-.041	.106	.059	-.005	.875	.037	-.038
IV1	.076	.042	.123	.054	-.016	.810	-.016	-.004
IV3	-.016	.028	.032	-.031	.111	.707	.065	.043
Quality	.234	.130	.027	-.065	-.062	.069	.708	.004

*Item deleted because of high cross-loading (> .40) **Item deleted because of loading < .70

a OIP = Online Interaction Propensity; Quantity = Quantity of Knowledge Contribution; CCOM = Commitment to the Community; REC = Reciprocity; CHOST = Commitment to the Host Firm; SP = Sportsmanship; IV = Perceived Informational Value; Quality = Quality of Knowledge Contribution

Table 2a Mean, Standard Deviation, Range, Composite Reliability, and Average Variance Extracted

Construct[a]	Mean	Std Dev	Range	CR	AVE	Sqrt AVE
REC	4.79	1.19	1-7	.97	.90	.95
CCOM	5.03	1.79	2.33-7	.98	.95	.91
CHOST	6.26	.76	4-7	.94	.83	.97
OIP	4.98	1.04	1.71-7	.96	.85	.92
SP	5.99	.73	3.33-7	.88	.71	.84
IV	4.85	1.33	1-7	.91	.76	.87
Quality	2.18	1.39	1-7	na	na	n.a.
Quantity	15.74	28.21	0-190	na	na	n.a.

a REC = Reciprocity; CCOM = Commitment to the Community; CHOST = Commitment to the Host Firm; OIP = Online Interaction Propensity; SP = Sportsmanship; IV = Informational Value; Quality = Quality of Knowledge Contribution measured by the "hat" of the respondent; Quantity = Quantity of Knowledge Contribution measured by the number of answers to technical questions per respondent

Table 2b Correlations of Latent Variables and Interaction Terms

	Construct[a]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	REC	**1.00**																
2	CCOM	.29	**1.00**															
3	CHOST	-.02	.05	**1.00**														
4	OIP	.29	.49	-.01	**1.00**													
5	SP	-.04	-.09	-.12	.01	**1.00**												
6	IV	.21	.07	.05	.15	.03	**1.00**											
7	Quality	.12	.27	-.09	.31	-.06	.10	**1.00**										
8	Quantity	.41	.46	-.07	.63	-.01	.24	.50	**1.00**									
9	IV*REC	.26	.18	-.10	.09	-.13	.01	.19	.24	**1.00**								
10	IV*CCOM	.19	-.01	-.04	.07	.01	.11	.17	.18	.18	**1.00**							
11	IV*CHOST	.10	.04	.03	.08	-.09	.15	.15	.11	-.01	.20	**1.00**						
12	SP*REC	.08	-.02	-.04	-.10	.06	-14	-.06	-.01	-.01	-.10	.06	**1.00**					
13	SP*CCOM	-.02	.06	.02	.02	-.12	.01	.01	.01	-.07	-.02	.02	.33	**1.00**				
14	SP*CHOST	.03	-.02	.03	-.09	-.31	-.10	.08	-.04	.04	.02	-.02	.03	.03	**1.00**			
15	OIP*REC	.29	.16	.10	.21	-.09	.09	.18	.42	.27	.21	.01	-.08	-.01	-.11	**1.00**		
16	OIP*CCOM	.22	.15	-.05	.08	.03	.09	.23	.41	.16	.14	.03	-.02	-.04	-.10	.27	**1.00**	
17	OIP*CHOST	-.09	.03	.14	.12	-.07	.07	.07	.14	-.01	-.01	-.11	-.07	-.03	.26	.35	-.11	**1.00**

a REC = Reciprocity; CCOM = Commitment to the Community; CHOST = Commitment to the Host Firm; OIP = Online Interaction Propensity; SP = Sportsmanship; IV = Informational Value; Quality = Quality of Knowledge Contribution measured by the "hat" of the respondent; Quantity = Quantity of Knowledge Contribution measured by the number of answers to technical questions per respondent

Table 3 Results for Hierarchical Models

Testing Hierarchical Models

Model [b]	R^2		F		Incremental R^2		Incremental F		GoF [d]
	Quality	Quantity	Quality	Quantity	Quality	Quantity	Quality	Quantity	
M1	.082	.305	5.955**	29.257**	na	na	na	na	.414
M2	.130	.491	4.981**	32.155**	.048	.186	3.678*	24.361**	.505
M3	.216	.619	3.673**	21.662**	.086	.128	2.438*	7.466**	.586

Parameter Estimates for Model M3

Construct [c]	β		Bootstrapped SE		t-statistic		Hypotheses		Findings	
	Quality	Quantity	Quality	Quantity	Quality	Quantity	Quality	Quantity	Quality	Quantity
REC	-.100	.069	.078	.064	-1.281	1.076	H1a	H1b	Not supported	Not supported
CCOM	.131*	.141**	.071	.056	1.846	2.503	H2a	H2b	Supported	Supported
CHOST	-.091*	-.081	.053	.056	-1.717	-1.453	H3a	H3b	Not supported	Not supported
OIP	.225**	.455**	.084	.078	2.655	5.846	na	na	na	na
SP	.009	.025	.081	.049	.110	.505	na	na	na	na
IV	.051	.119*	.069	.052	.733	2.226	na	na	na	na
IV*REC	.102	.049	.068	.060	1.483	.802	H4a	H4b	Not supported	Not supported
IV*CCOM	.085	.032	.067	.036	1.259	.878	H4c	H4d	Not supported	Not supported
IV*CHOST	.110	.029	.067	.055	1.626	.531	H4e	H4f	Not supported	Not supported
SP*REC	-.024	.072	.072	.054	-.331	1.332	H5a	H5b	Not supported	Not supported
SP*CCOM	.010	-.011	.070	.037	.138	-.298	H5c	H5d	Not supported	Not supported
SP*CHOST*	.138*	.065	.074	.052	1.847	1.254	H5e	H5f	Supported	Not supported
OIP*REC	.064	.202**	.097	.077	.662	2.613	H6a	H6b	Not Supported	Not Supported
OIP*CCOM	.155*	.245**	.073	.046	2.123	5.402	H6c	H6d	Supported	Supported
OIP*CHOST	.022	.012	.104	.095	.215	.124	H6e	H6f	Not supported	Not supported

a * p < .05 (one-tailed test), ** p < .01 (one-tailed test)

b M1: predictor variables; M2: predictor and moderator variables; M3: predictor variables, moderator variables and interaction terms

c REC = Reciprocity; CCOM = Commitment to the Community; CHOST = Commitment to the Host Firm; OIP = Online Interaction Propensity; SP = Sportsmanship; IV = Informational Value

d Goodness-of-Fit Measure (Tenenhaus et al., 2005)

Appendix Questionnaire Items

Construct	Wording of the items
Reciprocity	Members should return favors when the X community is in need.
	When I receive help, I feel it is only right to give back and help others.
	The principle of give and take is important in the X community.
Sportsmanship	I tolerate minor imperfections in the X community.
	I overlook the negative details of the X community and focus on the positive ones instead.
	I accept that not every answer to my questions in the X community is perfect.
	*I do not spend a lot of time complaining about trivial matters in the X community.**
Commitment to Community	The relationship I have with the X community is something to which I am very committed.
	The relationship I have with the X community deserves my effort to maintain.
	The relationship I have with the X community is one I intend to maintain indefinitely.
Commitment to Host Firm	The relationship I have with the X community host is something to which I am very committed.
	The relationship I have with the X community host deserves my effort to maintain.
	The relationship have with the X community host is one I intend to maintain indefinitely.
Online Interaction Propensity	In general, I like to get involved in online discussions.
	I am someone who enjoys interacting with like-minded others online.
	I am someone who likes actively participating in online discussions.
	In general, I thoroughly enjoy exchanging ideas with other people online.
	*I find the idea of belonging to an online discussion group pleasant.**
	*I am someone who likes interacting with like-minded others online.**
	*In general, I am someone who enjoys initiating a dialogue online.**
	*In general, I am someone who, given the chance, seeks contact with others online.**
Informational Value	The information provided by the X community is useful.
	The information provided by the X community is valuable.
	The X community is a great way to get answers to X-related questions.

*Item deleted from final analysis

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