When Consumers Produce on the Internet: The Relationship between Cognitive-affective, Socially-based, and Behavioral Involvement of Prosumers

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ABSTRACT

This article advances our understanding of the motivational sources for consumer involvement in online joint innovation. The 'free' or 'open-source' software movement is the largest socio-technical network and most visible empirical evidence of this new phenomenon. The paper promotes a behavioral view of involvement and offers a conceptualization and empirical evidence of the relationship between cognitive-affective, socially-based and behavioral involvement in online joint production. An Internet survey with 1486 contributors to open-source software revealed that the extent of behavioral involvement is strongly related to the structure and strength of relationships between different motivations. The relationship between concern for self and concern for others especially distinguishes the level of contribution to online projects.

The advent of the World Wide Web and the dissemination of user-friendly server and browser software have led to an unprecedented degree of global interconnectedness. The Net is an interactive and communicative platform where users can store, search for, distribute and exchange vast amounts of digital information inexpensively (Peterson et al., 1997). It has been argued (e.g.: Kollock and Smith, 1998; Kuwabara, 2000) that the ease and low cost of digital information exchange on the Internet will have profound motivational and behavioral effects on consumers. Empirical evidence shows that social interaction between involved consumers increasingly takes place in the common virtual space (Kozinets, 1999). Consumers gather together, 'homesteading their land in this new virtual space' (Rheingold, 2000) and sharing their common interests (Armstrong and Hagel, 1996). On various Internetsites, consumers become involved in auctioning (eBay.com), reviewing books (amazon.com), on-line chatting in various special interest groups, and building 'brand communities' (Muniz and O'Guinn, 2001).

One important but hitherto almost neglected implication of the Internet is that it empowers consumers to be more active participants in the 'economic game'. In an extreme form, communities of interest created for and composed of users engage in online joint production of innovative products and services. An intriguing example of such online joint production is the immense productivity of the open-source community and the resulting global success of open-source software. Thousands of expert programmers and millions of users worldwide voluntarily work on creating new and improving existing open-source software (Raymond, 1999). High quality software has been produced and published on the Internet, including the source code. A prominent example is the operating system Linux, which has become the main Web-server platform worldwide. Like any other open-source software, Linux is free for everybody to download, and those who are experienced enough

can contribute to the source code. This has attracted numerous professional and hobby programmers who contribute code and improve on the new operating system.

Several open-source communities have proven to be capable of creating and sustaining complex innovations without any manufacturer involvement. Von Hippel (2002) pointed out that our understanding of such phenomena is still in its infancy. However, these developments are important for marketing theory and practice because they offer new ideas and opportunities for consumer-manufacturer cooperation. They also stimulate deeper understanding of enthusiastic consumers' desires and needs (Belk et al., 2000) and promote a rethinking of traditional business models as consumers become producers. Companies are challenged to extend their view beyond the traditional boundaries of the firm and to include and treat consumers as potential partners for innovation.

The purpose of this article is to enhance our understanding of the phenomenon by addressing the question of what attracts and motivates volunteers to get and stay involved in contributing to a collective effort on the Net. Furthermore, because consumers' expertise and potential to contribute differs, it distinguishes among the different levels of involvement with regard to the amount and type of contribution to joint production and how this is related to producing consumers' (=prosumers) motives. To this end, this paper offers a conceptualization of the motivational sources of consumers' involvement in joint production on the Internet, based on theories of involvement, work motivation, voluntary contribution and enthusiastic consumer behavior. First, consumers' involvement in contributing to innovative production is discussed. A behavioral view of involvement in contribution behavior is introduced and the affective-cognitive component of involvement elaborated on, using the findings of research on work motivation, volunteering and pro-social behavior. The discussion results in four classes of motivations underlying voluntary contributions to joint production and propositions about the interrelationships between different levels of behavioral

involvement and underlying motivations. In addition, this research provides first insights into the actual motivations and their interrelationships among members of the open-source community. Empirical evidence based on a Web survey is provided. A content analysis and subsequent categorical data analysis were performed of verbal protocols provided by over 1000 co-producers of open-source software. The paper concludes with a discussion of the findings and their implications for marketing theory and practice.

COGNITIVE-AFFECTIVE AND BEHAVIORAL INVOLVEMENT IN ONLINE JOINT PRODUCTION

Consumers' willingness to engage in contribution behavior requires a considerable level of involvement. Involvement has both cognitive-affective and behavioral components that are closely related (Houston and Rothschild 1978). The cognitive-affective component is most extensively treated in the marketing literature and is introduced first.

Involvement as an affective-cognitive construct generally refers to the perceived personal relevance of an object or event to a consumer (Zaichkowsky, 1985). It expresses the intensity of motivation as experienced by an individual (Ratchford and Vaughn, 1989). Involvement theory offers a variety of antecedents or sources of consumers' involvement. Bloch and Richins (1983) distinguish between instrumental importance, which is based on a person's desire to obtain particular extrinsic goals, and the enduring importance of an object based on the strength of the object's relationship to central needs and values. Whereas instrumental importance is usually short-term and declines with the achievement of an extrinsic goal, enduring involvement refers to a long-term motivational state. Mittal and Myung-Soo (1989) made broad distinctions among three sources of involvement: (1) utilitarian goals such as the perceived use-value of an object, (2) hedonic goals, and (3) symbolic and sign goals (see also: Laurent and Kapferer, 1985). Utilitarian goals and extrinsic

goals both refer to an individual's striving for valued outcomes, whereas hedonic goals are achieved by using or acting upon objects, which in and of itself is considered intrinsically rewarding. Involvement may also stem from the symbolic meaning or sign value of an object vis-à-vis relevant others, which helps project a positive image for others to view. Thus, involvement is induced not only by a pure person-object relation but also by its relationship to relevant others.

Involvement has a behavioral component as well. This was perhaps most explicitly described in the S-O-R involvement formulation of Houston and Rothschild (1978; see also Arora 1982). Stone (1984) defined behavioral involvement as the time and/or intensity of effort expended in pursuing a particular activity. Behavioral involvement thus refers to the level of behavioral engagement of an individual. It is proposed here that innovative consumer behavior on the Internet refers to both the affective-cognitive and the behavioral aspects of involvement. Consumers are involved in the sense that they care (cognitive-affective) and in the sense that they contribute (behavioral). When a person claims to be involved in a project, s/he is not merely thinking about it, but is actively doing something with it. The distinction between affective-cognitive and behavioral involvement is the difference between being involved with an issue and in a behavior. The distinction is important and not merely semantic. In the past, involvement research in the field of consumer behavior was aimed almost exclusively at measuring the cognitive-affective component and the extent to which individual predispositions are predictive of the target behavior. However, this does not mean that individuals are involved in the target behavior as well. The reason is that the source of involvement is different. Cognitive-affective states may lead to behavioral involvement and to a specific behavior. On the other hand, behavioral involvement may come first and lead to a successive cyclic deepening of cognitive-affective involvement over time. Qualitative differences in the patterns of behavior that consumers express with respect to the target of

their involvement are typically not studied. This research therefore aims to incorporate behavioral involvement into a conceptualization of consumer involvement in online production.

Some research, such as that on fashion involvement (Tigert, Ring and King 1976) and leisure research (Kim and Scott, 1997), reflects a similar approach. These contributions sought to find correlations between measures of affective-cognitive and behavioral involvement. Behavioral involvement was typically measured by time spent and efforts undertaken for the target of consumers' involvement. Kim and Scott (1997) found cognitive-affective involvement and behavioral involvement to be significantly correlated. Moreover, their analysis demonstrated that behavioral involvement measures were much better predictors of future behavioral intentions than measures of cognitive-affective involvement.

This present research goes beyond measuring cause-effect relationships. It aims at understanding the relationship between cognitive-affective sources of involvement and the extent of engagement in a particular activity. Furthermore, it tries to answer the question as to which specific combination of motivational sources determines the level of behavioral involvement in terms of contribution effort. It also differs from previous research in that the target of involvement as related to the level of behavioral involvement is not predetermined. The underlying reason for this is that people might be involved with a product, an activity, a group and/or a combination of these which may be related to different levels of behavioral involvement.

The next section offers a summary of relevant literature on cognitive-affective and other sources of involvement, which provides the basis for the empirical analysis. In order to portray the sources of behavioral involvement with contribution behavior, research on work motivation and voluntary work was consulted and integrated with the involvement literature. Furthermore, contributing to a collective effort transcends the individual realm; thus, social

sources of involvement are highly relevant for research into contribution behavior. Insights from research on pro-social behavior and consumption subcultures on activity-related and socially-induced motives are, therefore, incorporated into an extended conceptualization of involvement in joint production.

FOUR CLASSES OF COGNITIVE-AFFECTIVE AND SOCIALLY-BASED INVOLVEMENT IN JOINT PRODUCTION

It is important to distinguish between the target of involvement – what a person is involved with – and the cognitive-affective state that comes with it. This cognitive-affective state can be interpreted as a source of motivation which leads to behavioral involvement with the target in question. Consumers who contribute to online joint production may be involved with the task or work accomplished and/or the product generated. It is also proposed here that voluntary contribution is based on individuals' involvement with a group and its group goals. Theories of work motivation and the involvement literature suggest specific sources of involvement with a task or a product, and these will be introduced first.

Based on a review of current theories of work motivation, Leonard et al. (1999) proposed three main types of motivation which are based on different soources: (1) intrinsic process motivation, (2) extrinsic or instrumental motivation, and (3) motivation based on goal internalization. Involvement theory suggests similar motivational factors. Intrinsic process motivation is equivalent to hedonic goals achieved through the enjoyment of the task. Extrinsic or instrumental motivation derives from purely utilitarian goals which may be short-term (task-related) or have a long-term perspective. Laurent and Kapferer (1985) additionally suggest that the social significance that derives from the consumption of objects or activities constitutes an important extrinsic source of involvement.

Furthermore, research on voluntary work suggests that volunteers act according to two basic underlying motivational principles: self-interest and others-orientation (Derlega and Grzelak, 1982; Staub et al., 1984; Clark, 1991). Thus, involvement may also be induced by social, group-related factors such as the internalization of group goals and beliefs and/or the socio-emotional relationship with group members. Table 1 summarizes all the findings of the literature review in four main classes of sources of involvement that could spur consumers' contribution to joint production. Each of the four classes is subsequently discussed in more detail.

Table 1. Cognitive-affective and Socially-based Sources of Involvement

Self-Interest	*Others-orientation*
I *Task- and product-related motivation* intrinsic: hedonic value skills and challenge self-efficacy: competency and control short-term extrinsic: personal need product-related motivation	III *Internalized group goals and values* group attitude moral obligation equity - fairness helping others group values and beliefs
II *Long-term utilitarian goals and social significance* expected reciprocity social significance	IV *Socio-emotional relationships* social bonds advocacy

Task- and Product-related Motivation

Individuals are motivated intrinsically (Class I) when they perform a task just because it is 'fun', a joyful experience or passion in connection with certain activities that drives individuals to repetitive pursuance of these activities in order to maintain this state of 'jouissance' (Belk et al., 2000). With respect to diverse life activities, Csikszentmihalyi (1975; 1997) has explored the psychological dynamics of intrinsically involving, 'autotelic' activities. When individuals are completely involved with an activity and totally immersed in it, they experience a state of 'flow', which Csikszentmihalyi (1990) has characterized as 'optimal experience'. An important prerequisite for this rewarding experience is that an

individual is able to accomplish the task. But it is equally important that the task is experienced as a challenge and the individual gets unambiguous feedback inherent in the performance of the activity. This provides a sense of control over the action and over the environment. In the same vein, Deci (1975) argues that the main factors of motivation are an individual's need to regard him/herself as competent and to control the most important events in his/her life. Kollock and Smith (1998) and Kuwabara (2000) similarly argue that a sense of self-efficacy (Bandura, 1995) may play a major role in motivating people to make regular and high-quality contributions on the Internet. Self-efficacy refers to an individual's sense that s/he has an effect on the environment that directly derives from perceived competency and control accompanied by a sense of autonomy (Ryan and Deci, 2000).

Individuals may also be involved with a task or a product because they derive important short-term utilitarian benefits from acting or product usage. This is what Mittal and Myung-Soo (1989) described as the use-value of an object. Use-value can be derived from either using an available product or engaging in generating one's own product according to one's personal needs. Hence, potential contributors to online cooperation may be involved with the product and/or the task. The difference is important because deriving value merely from product usage will not directly lead to increased motivation to contribute to joint production. However, having a personal need which exceeds the functionality of the product may lead to behavioral involvement at any level of expertise. Sophisticated users who succeed in adapting the product will also experience a sense of self-efficacy which again motivates them to contribute.

Long-term utilitarian goals and social significance

A second source of motivation is that induced by external causalities (Class II). Most theories focusing on external sources of motivation assume that individuals act as "rational

maximizer(s) of personal utility" (Shamir, 1991, p.406). According to these theories, behavior is motivated by a rational calculation of the outcome probabilities of a specific behavior and the valence of the outcomes associated with the behavior. Expectations of reciprocity are based on the same rational grounds. The basic assumption is that individuals participate in an exchange relationship in order to achieve certain valued outcomes (March and Simon, 1958; Bagozzi, 1975). In the context of voluntary online cooperation, this would mean that people are motivated to contribute because they expect others to contribute back. Their level of behavioral involvement, then, would be externally regulated. In a study among students, Ryan and Connell (1989) found that the more externally regulated the individuals were, the less interest and effort they showed. Hence, it seems unrealistic to assume that expected reciprocity is a strong motivator for making voluntary contributions to an online community. However, if a community is successful and many people contribute, we can speak of a generalized, social exchange which could foster contributions. Social exchange implies that individuals rely on and trust each other for future reciprocation.

Other long-term rewards for online cooperation behavior have been proposed by Lerner and Tirole (2000). They suggest that groups of potential contributors strive for long-term rewards such as career opportunities and reputation incentives. Career opportunities were a source of motivation reported in a study among volunteer firefighters (Thompson and Bono, 1993). However, this extrinsic source of motivation gained only moderate importance in comparison to others. Status and prestige played a much more prominent role. Social approval is a basic reward people seek in social associations (Blau, 1964). Several other researchers from different areas have emphasized the importance of social significance, being valued by significant others, and gaining reputation (Laurent and Kapferer, 1985; Ryan and Deci, 2000) in determining an individual's course of action. In an online context, every contribution has the potential to reach a global public. This quality of the Internet makes it a

favorable place for individuals who seek social approval for their contribution. Therefore, we can expect social significance motives to have a major impact on behavioral involvement in online contribution.

Internalized group goals and values

Online participation may also be motivated by 'goal internalization' (Leonard et al., 1999) (Class III) when an individual adopts group attitudes and behavior because their content is congruent with his/her value system. The adoption of normative beliefs has also been discussed in research on high-involvement consumption behavior in specific 'subcultures'. Consumption subcultures or brand communities (Boorstin, 1973; Muniz and O'Guinn, 2001) have been defined as distinctive subgroups of society that self-select on the basis of a shared commitment to a particular product class, brand or consumption activity (Schouten and McAlexander, 1995). Offline as well as online groups develop specific cultures with unique rules of behavior and symbols and signs that express their 'ethos' (shared values and beliefs). Internalization means that group behavior, goals, and values become integrated and eventually fully transformed into an individual's own meaning system so that they will emanate from the individual's sense of self (Ryan and Deci, 2000). Internalization of a community's 'ethos' will certainly have a strong effect on an individual's motivation to participate and contribute to the group goal.

Goal internalization also reflects internalization of group goals and behaviors. Jointly innovating consumer communities depend on voluntary contributions; hence they have to offer a 'reason why', a worthwhile cause with which individuals can identify. Research into voluntary work, welfare contribution, and charity has found that people are motivated to contribute to a worthwhile cause because of other-regarding motives (Ferraro et al., 2003). Other-regarding motives may be induced by altruism (helping others) or concerns about

fairness. One reason for this is that it is considered to be morally right (see: Thompson and Bono, 1993; Jin, 1993; Fernando and Heston, 1997; van Oorschot, 1999). Etzioni (1975) refers to this as moral involvement which is the result of internalization of norms or culturally based convictions (Durkheim, 1973). According to Cialdini (1990), goal internalization may produce a feeling of moral obligation to contribute or it simply may be that people contribute because others are doing it and they consider their contribution to be a fair trade off for what they gain.

Increasing internalization is associated with a perceived internal locus of control which results in an increase in personal commitment. With personal involvement come greater persistence and better quality of engagement (Ryan and Deci, 2000). Hence we can conclude that the more individuals adopt group goals and values and integrate them into their own value system, the greater the likelihood that their behavioral involvement will be high.

Socio-emotional relationships

A final class of motivations concerns the value derived from forming and entertaining relationships with others (Class IV). Ryan and Deci (2000) argued that the primary reason people are willing to engage in a task is that they are valued by significant others to whom they feel connected. Especially with high-involvement activities, subgroups function as strong reference groups for their members, who act together and share very specific common meanings and experiences (Celsi et al., 1993; Holt, 1995; Schouten and McAlexander, 1995). These integrative bonds, reinforced by the shared interests discovered in the process of establishing them and by the common objectives and ideals that brought the group members together, are the basis for group cohesion. Nevertheless: "Associations have to be intrinsically attractive for large participation and contribution to occur, and integrative bonds of fellowship make them so." (Blau, 1964, p.50).

Despite initial questions as to whether individuals establish strong bonds and feelings of belonging in online communities, there is mounting evidence of such strong social ties (Fischer et al., 1996; Granitz and Ward, 1996; Kollock and Smith, 1998). Even in computer-mediated work groups, Sudweeks and Simoff (1999) found clear evidence of what they called 'socio-emotional' communication dealing with interpersonal relationships of team members. However, it is very likely that the development of friendships online and offline differs. McKenna and Bargh (2000) noted that physical appearance and visual cues are not as relevant on the Internet as they are in non-virtual settings. Hence, affinity, attraction and friendship in online communities are based on other cues. In an active, innovative online community, one of those cues is an individual's contribution to the group, which signals that s/he wants to become part of the group and form relationships. Over time those relationships will result in stronger commitment to the group and higher involvement in contribution behavior.

Individuals who are less behaviorally involved will be less likely to establish and maintain warm social relationships with group members but will certainly like the community, share its interests, and act as advocates for its ideas.

Self-interest and others-orientation

So far, the theoretical outline refers to the relationship of behavioral involvement in joint production with one specific class of motivation. In view of research on volunteerism (van der Togt, 1999), we can additionally propose that the kind and strength of relationships between the cognitive-affective and socially-based variables are related to the intensity of behavioral involvement. Researchers in the field of volunteerism report that volunteer work is strongly related to an increased sense of others-orientation (Thompson and Bono, 1993; Ferraro et al., 2003). As already discussed in previous sections, other-regarding behavior may be induced by a feeling of moral obligation, fairness or altruism. Whereas motivation theorists explain these

concerns as a result of goal internalization – thus, socially induced – processes, Marwell argued that helping behavior may also be intrinsically rewarding. Individuals receive gratification indirectly through the happiness of others (Marwell, 1982). Blau (1964) further argued that people strive to achieve diverse objectives in their life. "The statement that men select the most preferred among available alternatives does not imply that they always choose the alternative that yields the greatest profit. They may, and often do, choose the alternative that requires them to make material sacrifices but contributes the most to the attainment of some lofty ideal, for this may be their objective." (Blau, 1964, p.19).

People, of course, are not only socialized ideologists and altruists. Others-orientation also includes socio-emotional and communal relationships. To a considerable degree, people can also be motivated by their online social relationships. On the Net, individuals are valued for their contributions and not for their appearance. Online, people can construct their own ideal self and create their own personal history (McKenna and Bargh, 2000). Hence, they feel freed from their socio-geographical boundaries. Within a global online space, they are more likely to find people who share their specific interests, who are like them. This creates a strong commitment to the community, which fosters individual behavioral involvement in joint production.

A final proposition promoted throughout the motivation and volunteering literature is that individuals who are intrinsically motivated have a greater sense of self-determination and are thus more engaged in participation (Ryan and Deci, 2000). Hence, self-determined individuals will be more behaviorally involved in joint production than individuals who are motivated by extrinsic incentives such as expected reciprocity or future career concerns.

In sum we can propose that individuals who are motivated by internalized group goals and values, by socio-emotional bonds, and by an intrinsically motivating task will be more behaviorally involved in online joint production. According to the empirical findings of

research on volunteerism, we can also propose that the more motivated individuals are by others-orientation in relation to self-interest motives, the more they will engage in contribution behavior.

A QUALITATIVE INQUIRY AND QUANTITATIVE CONTENT ANALYSIS

To examine the role of motivational sources of involvement with respect to different levels of behavioral involvement, a Web survey among individuals who use and contribute to various open-source software projects on the Internet was analyzed. The open-source community was chosen as the most successful and extreme example (Patton, 1990) of consumer involvement in order to gain rich information from the research. The survey was designed and administered by a member of the community. This ensured trust and a response rate of approximately 10 percent, according to the population estimate of 12,706 by Ghosh and Prakash (2000). The survey was posted at slashdot.com. Most people who are interested in open source visit this site daily or keep themselves informed by searching the archive, so every community member had a chance to know about the survey. Respondents were asked to report freely about their involvement with open source (OS). The main advantages of the method used lie in its unobtrusiveness, the lack of any interviewer bias, and its 'natural setting' with respect to that group. Moreover, when individuals are not forced to respond to theoretically pre-established categories, they are more likely to report their prevailing motivations, which is desirable. However, the answers may be biased by social desirability, as is the case with most self-report data. Anonymity helped to keep this bias within acceptable limits.

The vast majority of the 1486 responses received were submitted within the first two weeks. Of these, 1139 responses were content-analyzed. The rest were eliminated because they contained either responses that did not refer to the questions at all or statements showing

that the respondent was not yet involved in a project and thus could not answer the questions. Content analysis and coding was done manually. Structuring content analysis was used for qualitative and quantitative analysis of the responses (Patton, 1990). This type of content analysis is used whenever it is possible to establish a theoretical prestructure on which the coding scheme can be built.

The coding scheme was revised twice. The whole data set was then coded independently by two coders who required intensive training to familiarize themselves with the theoretical background inherent in the classes and categories. In addition, an 'expert' coder familiar with the open-source community was asked to code a subset of 100 responses in order to ensure that the 'real' meaning was captured in the results. Moreover, several community sites, online journals and discussion lists were consulted for further support of the categories.

After two iterations of the coding process, independently and without comparing the results beforehand, interjudge reliability ranged between 90.8% and 100%, with a 97% average (across all categories). Remaining disagreements were discussed and solved within the coding team including the expert coder. The resulting 34 categories were then coded as dummy variables and served as input to a subsequent contingency analysis of the data. The number of motives reported per person ranged between 1 and 9 (modus: 2, median: 2, mean: 2.27). As shown in Table 1, the resulting categories were also summarized into broader and more abstract motivational classes in order to analyze the relative importance and interrelationships between them. Co-occurrences of motivations were calculated using the Jaccard coefficient (Aldenderfer, Blashfield, 1984; Everitt, 1993), which is the ratio of the number of matches of two categories to the number of non-matches and has a range from 0 to 1. Matches of 'absent' categories were excluded, as it seems questionable to conclude that individuals are similar simply because they do not mention a specific category.

In order to be able to distinguish between different intensity levels of behavioral involvement, subjects were divided into three main groups according to the quality and number of contributions made. Two expert coders who are familiar with several OS-projects judged the size and importance of a project and the quality of contributions, respectively. Individuals were then categorized as a 'main contributor', a 'contributor', or a 'user'.

FINDINGS AND DISCUSSION

Respondents reported a variety of motives for their contribution behavior. In keeping with the theoretically established classes (Table 1), these were categorized as intrinsic and extrinsic task-related rewards, product-related benefits, long-term extrinsic interests and social significance, internalized group goals and values, and socio-emotional motives. A contingency table for classes and categories per groups is presented in Table 2. Pearson chi-squares were computed to test for independence of motivations and groups. Tests were only performed for expected cell frequencies >5. Counts and percentages of classes represent the number and percentage of respondents who mentioned one or more motives within the respective class rather than the total number and percentage of responses.

Table 2. Overall and Group Classes and Category Frequencies

Motivations		*Level of Contribution*							
Classes	***Categories***	***Main Contributors*** (n=88)		***Contributors*** (n=897)		***Users*** (n=154)		***Total*** (n=1139)	
		Count	% within group	count	% within group	count	% within group	count	% within group
task-related[b]									
Intrinsic[a]									
	hedonic value[b]	21	23.9%	174	19.4%	12	7.8%	207	18.2%
	be outstanding[a]	21	23.9%	153	17.1%	6	3.9%	180	15.8%
	challenge	3	3.4%	18	2.0%	-	-	21	1.8%
	control[a]	10	11.4%	56	6.2%	28	18.2%	94	8.3%
	self-efficacy	3	3.4%	23	2.6%	1	0.6%	27	2.4%
No. of respondents within intrinsic		*48*	*54.5%*	*357*	*39.8%*	*43*	*27.9%*	*448*	*39.3%*
Extrinsic									
	personal need[a]	27	30.7%	365	40.7%	29	18.8%	421	37.0%
	need for work[a]	6	6.8%	58	6.5%	25	16.2%	89	7.8%
	dissatisfaction[a]	10	11.4%	42	4.7%	20	13.0%	72	6.3%
	pays my salary	2	2.3%	12	1.3%	2	1.3%	16	1.4%
No. of respondents within extrinsic		*38*	*43.2%*	*441*	*49.2%*	*70*	*45.5%*	*549*	*48.2%*
No. of respondents within class		**64**	**72.2%**	**655**	**73.0%**	**94**	**61.0%**	**813**	**71.4%**
product-related[a]									
	perceived quality[a]	12	13.6%	69	7.7%	46	29.9%	127	11.2%
	economic reason[c]	2	2.3%	19	2.1%	26	16.9%	47	4.1%
No. of respondents within class		**14**	**15.9%**	**85**	**9.5%**	**65**	**42.4%**	**164**	**14.4%**
long-term utilitarian goals and social significance[c]	exp. reciprocity	6	6.8%	64	7.1%	3	1.9%	73	6.4%
	career prospects	1	1.1%	26	2.9%	3	1.9%	30	2.6%
	gaining knowledge	20	22.7%	208	23.2%	43	27.9%	271	23.8%
	reputation[c]	10	11.4%	46	5.1%	1	0.6%	57	5.0%
	external response[c]	12	13.6%	27	3.0%	1	0.6%	40	3.5%
	fame[c]	6	6.8%	11	1.2%	-	-	17	1.5%
No. of respondents within class		**42**	**47.7%**	**324**	**36.1%**	**49**	**31.8%**	**415**	**36.4%**
internalized group goals and values[a]	moral obligation	2	2.3%	20	2.2%	1	0.6%	23	2.0%
	fairness[a]	12	13.6%	167	18.6%	4	2.6%	183	16.1%
	altruism[a]	27	30.7%	214	23.9%	10	6.5%	251	22.0%
	worthwhile cause[c]	8	9.1%	33	3.7%	3	1.9%	44	3.9%
	humanism[c]	5	5.7%	12	1.3%	-	-	17	1.5%
	freedom, autonomy	9	10.2%	33	3.7%	9	5.8%	51	4.5%
	cooperation	6	6.8%	24	2.7%	2	1.3%	32	2.8%
No. of respondents within class		**54**	**61.4%**	**463**	**51.6%**	**25**	**16.2%**	**542**	**47.6%**
socio-emotional relationships	OS advocacy	2	2.3%	26	2.9%	6	3.9%	34	3.0%
	group boundaries[c]	-	-	15	1.7%	11	7.1%	26	2.3%
	work with the best	5	5.7%	28	3.1%	1	0.6%	34	3.0%
	group bonds[c]	9	10.2%	28	3.1%	1	0.6%	38	3.3%
No. of respondents within class		**15**	**17.0%**	**90**	**10.0%**	**18**	**11.7%**	**123**	**10.8%**

Note. [a]$p < .001$; [b]$p < .01$; tests were only performed for expected cell frequencies > 5
p[c] = significant for the two groups with higher frequencies

Self-Interest Motives

Not surprisingly, intrinsic and extrinsic task-related motives were mentioned quite often and rank first across classes (71.4% of all respondents). To illustrate this, one contributor mentioned the following reasons for being behaviorally involved:

> "1) Improve computing and make computing easier/better
>
> 2) Notoriety (if I come up with something new)
>
> 3) Communicate with people of similar interests
>
> 4) Increase my knowledge of computers
>
> 5) Because it's fun and an excellent way to unwind"
>
> *(contributor)*

Contributors as well as users agree to a great extent on their need for functionality and use-value. However, they differ significantly in their line of reasoning. Contributors' main source of motivation is programming for their own personal needs (30.7% of main contributors and 40.7% of contributors). Users mainly need OS-software for work (16.2%) and use it out of dissatisfaction with proprietary software (13%). Their primary source of motivation is the use-value of products in terms of perceived overall quality, including the price-quality relation (42.4%). For users, being able to control tasks themselves represents one of the main intrinsic benefits gained from using and working with OS products (18.2%). This may be explained by the novelty of open-source software and its perceived advantage over other products in terms of flexibility and adaptability to the user's own needs.

Whereas users' motives are strongly product-induced, contributors are significantly more intrinsically motivated. The relationship between behavioral involvement and intrinsic motivation (hedonic value) is highly significant (see Table 2). Contributors in the survey voiced this as follows: "It's the thrill of the hack" (contributor), "…to tinker and play around with things" (contributor), and "Mostly just to have fun -- I love programming…" (contributor). Thus, the

fun and pleasure resulting from the pursuance of the activity itself plays a decisive role in the intensity of behavioral involvement.

The feeling of being able to control a task turned out to be a main benefit of engaging in programming and adapting software. Surprisingly, users (18.2%) and main contributors (11.4%) report this more often than contributors (6.2%). The higher level of expertise of main contributors and the relatively lower level of expertise necessary for usage may explain this. Although the respondents very rarely explicitly mentioned challenge and a sense of self-efficacy, various other investigations have shown that these factors 'refuel' work motivation (Bandura, 1995). This process is fostered not only by the activity's hedonic value but also by the individual's desire to be outstanding. As Table 2 shows, a considerable percentage of the respondents (23.9% of main contributors and 17.1% of contributors) report their striving for superiority. Improving the quality of software in general is one of their main task-related objectives. Jagacinski and Strickland (2000) refer to this as ego orientation. When approaching achievement tasks, the authors argue, people can focus either on the task itself because it is intrinsically motivating and/or on demonstrating their superior ability because they want to be outstanding.

Although a high percentage of contributors look for personal and short-term benefits, the high proportion of people who emphasized their appreciation or hope of gaining knowledge through contributions or usage also represents an important long-term motive for all three groups (23.8% of all respondents). Although it is not significant, users (27.9%) even mention 'gaining knowledge' slightly more often than others.

Lerner and Tirole (2000) suggested that career prospects also provide an important future incentive for contributing. Striving for a future career can be found in respondents' answers, too, but frequencies are far too low to draw any conclusions. However, contribution behavior is strongly associated with external and internal response as sources of motivation.

Internal response refers to feedback from peers, whereas external response reflects feedback from a global online public outside the open-source project teams. Getting positive feedback from users and peers constitutes the difference between 'normal' and main contributors (9.3% and 31.8%, respectively).

In sum, we can conclude that intrinsic task-related motivation is positively related to the level of behavioral involvement, and product-related involvement is negatively related to behavioral involvement. Furthermore, there is clear evidence that extrinsic task-related motives are relevant at any level of behavioral involvement. However, as mentioned above, we should differentiate among the specific subcategories of motives mentioned by the three groups in question. Respondents rarely mentioned expected reciprocity and career concerns as reasons for contributing. However, 'gaining knowledge' accounted for a substantial number of responses even though it did not discriminate among groups. In contrast, social significance motives are strongly related to high behavioral involvement.

Other-Related Motives

> "Many things … often different things for different projects. First, I like to help people. When someone (usually a non-programmer friend) would be better off with an application that doesn't exist yet, or a new feature added to an existing application, it is my pleasure to implement it for their use. It's no different from helping someone move a piece of furniture from one room to the other -- they need a hand, so I provide one."
>
> (*contributor*)

As already pointed out in the conceptual section, contributing to a collective effort can hardly be a behavioral outcome of purely self-concerned motivation. Research on pro-social behavior has shown that other-related concerns, internalized group goals and values, and community bonds are decisive factors in volunteering (see: Staub et al., 1984 for a

comprehensive overview). The above comments of a contributor about his/her motivations illustrates this.

According to the theoretical discussion of other-regarding concerns, respondents' statements have been carefully investigated and categorized as either moral obligation, a concern for fairness ('it is only fair to give something back') or altruism ('helping others'). In the overall rankings, the three concepts are second, after task-related rewards (46.6% of main contributors and 44.7% of contributors); however, feelings of moral obligation rank very low (2% in total). Helping and giving back to the community represents one of the strongest social norms of exchange. Keeping exchange in balance by returning the favor is a line of reasoning which is typical for the contributor group (18.6%). Main contributors address it to a lesser extent (13.6%) as they are the main 'givers'. Users, quite obviously, differ significantly in that respect. Even more respondents in the first two groups state that they want to help others (30.7% of main contributors and 23.9% of contributors, compared to 6.5% of the user group). The relationship between altruism and contribution behavior is substantial, which leads to the conclusion that either more altruistic individuals tend to contribute more or individuals who get highly involved with contributing adopt the more 'egoless' culture of long-term 'hackers'.

Behavioral involvement is also reflected in the underlying value structure of individuals. Users score very low in this class. The total number of values mentioned, for example freedom or humanism, is low in general (6% in total), and group differences are more slight than significant. However, these results may be partly due to the methodology chosen. In the human mind, ideologies tend to constitute themselves as appropriate courses of action (Wagner, 1996), which implicitly express their worldview. Because individuals subscribe to the community's ideologies and believe in its value, they find it fair to return what they have gained and are motivated to help community members and other people in general.

Friendship and a ‘we’ feeling frequently develop in productive online communities. Main contributors mention friendship, a sense of belonging and their appreciation of working with their expert fellows more often than contributors do (15.9% and 6.2%, respectively). Despite the low frequencies, it seems reasonable to conclude that strong social ties such as friendship and belonging only develop over a long period of time and intense interaction within a stable group, as is the case with main contributors. As proposed, users express their affiliation with the community differently due to the absence of social bonds. They show their loyalty by advocating the aims of the community and resisting other software producers (11% out of a total of 17.9%). This has been also found elsewhere in online user communities (Muniz and O’Guinn, 2001). Related patterns of behavior and attitudes have been observed in research on in-group cohesion and inter-group conflict (Wetherell, 1996; Tajfel and Turner, 1979). There is a direct association between positive sentiments toward and actions for the in-group and mirror-image negative sentiments and actions directed toward out-groups.

In general, the data provide clear evidence for the importance of goal internalization, values and strong group bonds for high behavioral involvement. Particular attention must be paid to the concrete underlying categories which are specific to a certain community, as some are explanatory with respect to behavioral involvement and some are not. Because they have no personal friendships with community members, 'users' mainly express their loyalty by resisting commercial software and emphasizing the group boundaries between proprietary software users and the advocates of the idea of open-source software.

Relationships between Motivational Sources

Another objective of this research is to determine whether different levels of behavioral involvement are related to the number and combination of underlying motivations mentioned by the respondents. With respect to co-occurrences of motivation, Jaccard measures show how strongly or weakly two motivational concepts are related to each other. They may be interpreted as the percentage of individuals who reported on both classes of motivations. The ratios also reflect the average number of motives reported per respondent. Jaccard coefficients have a possible range of 0 to 1.

Table 3. Associations between Classes of Motivations per Involvement Group

All groups

Jaccard ratios	product	goal int.	long-term	socio-em.
goal int.	.103			
long-term	.072	.248		
socio-em.	.091	.088	.091	
task-related	.115	**.314**	.251	.086

Contributors

Jaccard ratios	product	goal int.	long-term	socio-em.
values	.100			
long-term	.051	.245		
socio-em.	.108	.089	.092	
task-related	.090	**.337**	.255	.078

Main contributors

Jaccard ratios	product	goal int.	long-term	socio-em.
goal int.	.193			
long-term	.098	.352		
socio-em.	.115	.113	.140	
task-related	.099	**.422**	.325	.129

Users

Jaccard ratios	product	goal int.	long-term	socio-em.
goal int.	.059			
long-term	.140	.156		
socio-em.	.051	.049	.047	
task-related	**.262**	.063	.172	.109

In Table 3, associations between the main classes of motivations that emerged from content analysis are presented for all respondents as well as group-wise. Jaccard ratios show that groups differ either in terms of which concepts they report together most often or in the strength of relationships. Main contributors most strongly relate task-related motives to internalized group goals and values (Jaccard ratio: .422). Table 3 reveals that this result is mainly due to the correspondence of intrinsic motivation and altruistic reasons as well as values, whereas contributors tend to relate extrinsic task-related motives to the group norms of helping and fairness. The main contributor group also strongly combines their values with long-term interest in learning and getting feedback from peers and users (Jaccard ratio: .352)

as well as long-term interest with task-related motivations. (Jaccard ratio .325). Thus, main contributors can be circumscribed as hedonistic and altruistically motivated people who are eager to learn, believe in the worth of what they are doing, and derive satisfaction from recognition and reputation. Table 3 shows slightly weaker overall measures for contributors. A more differentiating view in Table 2 reveals that their strivings are more extrinsic, less altruistic, and less value-based. Programming for one's own needs, having fun doing and learning from it, and helping the community is the most common line of reasoning among contributors.

For the user group as a control group, the highest ratio refers to perceived product benefits and task-related motives (Jaccard measure: .262). Users derive their benefits directly from the use-value of the product, which allows for greater flexibility and adaptability and therefore provides more control over the task (see also Table 2). Although the motivation of users is highly product-oriented, measures also show some overlapping of task-related and long-term interests (Jaccard ratio: .172). As Table 2 shows, this is almost exclusively due to their curiosity and willingness to learn in combination with control over the task, need for work, and dissatisfaction with proprietory software.

Are contributors' actions driven mainly by self-interest, by others-related motives, or by both? Our results strongly support the assumption that behavioral involvement in online contribution is associated with the individual's level of concern for others. Individuals who contribute more are significantly more others-oriented. Main contributors most strongly relate self-interest to others-oriented motives (Jaccard ratio: .500). Contributors do this to a reasonable but lesser extent (Jaccard ratio: .375), whereas users mainly stick to their own benefits (Jaccard ratio: .101). This is in line with the findings of Clary and Snyder (1991) and van der Togt (1999) about motives for pro-social behavior but clearly contributes to research on consumer involvement. This result also leads to the conclusion that others-concern

corresponds with contribution behavior as such and is not altered or diminished by online environments. Furthermore, the ratios indicate that individuals are not driven by either selfish or altruistic motives but rather act according to both. Overall, it can be concluded that the intensity of behavioral involvement in online contribution corresponds with a higher number of salient motivations as well as with a more intrinsic, more altruistic, more socially- and value-based motivational basis.

THEORETICAL IMPLICATIONS

With regard to online consumer behavior, our findings suggest that involvement theory offers a valuable approach to the understanding of online joint production behavior of consumers. Nevertheless, we have to expand the traditional view in order to capture the richness of consumer involvement in online joint production.

Utilitarian, hedonic and sign goals (Mittal, and Myung-Soo, 1989) were supported as motivational principles which can be generalized. However, the list is not finite and its specific underlying motivations differ. Utilitarian goals are extended by future-oriented strivings, such as gaining knowledge and improving skills. Researchers have argued that the enormous capabilities of the Internet to provide information and expert help have dramatically increased the global knowledge base. Hence, people who are eager to learn gather together on Internet platforms and get involved in various interest groups and projects. Hedonic value is inherent in the activity (Csikszentmihalyi, 1975; 1997) rather than the product itself. The source of involvement, either an activity or a product, strongly relates to the behavioral outcomes. Product involvement as such is only indirectly related to behavioral involvement, whereas being involved in 'tinkering and playing around' seems to be a much better predictor of getting involved in joint production. Sign value derives from what people produce and give away rather than what they possess. The social significance of what they do is reflected in

social approval, for example reputation and feedback from users. Internalized group norms and ideologies provide the most solid explanation for voluntary contribution to a collective effort. Giving back to the community and helping others, like in gift communities (Hyde, 1983; Raymond, 1999), represent the basis for sustained social exchange. As Haas and Deseran (1981) proposed, individuals rely on and trust each other for future favors, and this forms the basis of their community. Thus, behavioral involvement is also deeply rooted in socially- and value-based sources. Differences between groups in the levels of concern for self and for others further support this conclusion and confirm findings in research on voluntary work (van der Togt's, 1999). Furthermore, group ideology (Schouten and McAlexander, 1995) and socio-emotional relationships emerged as important driving forces of intense contribution to online joint production.

As proposed, motivational sources for different levels of behavioral involvement differ in terms of the number, importance and strength of relationships. The more various motivations correspond, the higher an individual's engagement in a common task. According to Lerner and Tirole (2000), engagement in joint production on the Internet is due either to immediate benefits of hedonic and use-value or to delayed benefits, including career prospects and reputation incentives. Our results, however, suggest that the motivational basis for high behavioral involvement derives from the correspondence of immediate benefits and future reputation incentives. It is especially the correspondences between task-related, long-term motivational sources and a group's ethos that lead to higher behavioral involvement.

Our research both supported and extended existing theories of behavioral involvement and motivation. Evidently no single approach can hope to capture the richness of motivational sources of consumer involvement on the Internet. The behavioral approach to consumer involvement revealed that the extent to which consumers engage in a particular behavior is reflected not only in a corresponding level of cognitive-affective and socially-based

involvement, but also in qualitatively distinct motivations. Whereas low levels of behavioral involvement strongly correspond with intrinsic and extrinsic motivations and product-related rewards, enthusiasm is interconnected with value-based and others-related motives. However, when interpreting the data, it must be considered that these are personal reports and thus may be subject to a social desirability bias. Individuals' reported motivations may also reflect social processes of co-construction of a commonly shared reality including social norms of thinking and acting. Although this viewpoint goes beyond the focus of this paper, it nevertheless constitutes an important proposition which should be addressed in future research. Conceptualizations based on multiple theories are better suited to gaining a deeper understanding of such phenomena.

IMPLICATIONS FOR MARKETING STRATEGY AND ACTION

The implications for companies and organizations interested in online cooperation with expert consumers are numerous. Insights on how to benefit-segment the online 'prosumer' market is one important strategic implication of this research. Whereas low involved consumers demand high quality products which are inherently fun to use, enthusiasts strive for task-related features that allow them to tinker and play around and become innovative. However, standard marketing strategies for highly involved consumers have to be adapted to the specific characteristics of the Internet as an interactive medium. It is important to give consumers the necessary tools which, in the case of software, means providing the source code. For other, non-digital products, for example furniture or jewelry, it could mean offering tools such as Java applets that allow consumers to tinker and play around with images of product features that can be put together and synthesized into a new innovative product idea.

Joint-producing online communities not only demand highly interesting tasks and a high degree of autonomy, but also the opportunity to gain knowledge. Thus, companies will

have to offer their know-how and expert help if they are to provide learning opportunities for their consumers and partners. For one thing, communication has to be highly informative (Bloch, 1986) and task-related. But it is equally important to provide bi- and multidirectional feedback on consumer activity. In order to sustain consumer innovativeness, organizations could set up or employ interactive learning platforms on the Internet, focusing on specific tasks and group interests and providing regular feedback and gratification. Administering FAQ lists, responding to requests in "ask"-sections, contributing to the "hall of fame", and administering and contributing to special interest group mailing lists and chat-rooms are concrete examples of implementation.

Freedom, autonomy, returning a favor and helping others emerged as important values in such online communities. Therefore, organizations not willing to share their innovative ideas on the Internet or allow usage and modifications of their digital products and services will not be able to build up online cooperative relationships with consumers. Gaining trust online constitutes one of the main challenges companies will be faced with. Building up friendships and fostering a sense of belonging within an online community of 'prosumers' might be hard to achieve. Hence, adopting the typical Internet culture of sharing and openness (Berners-Lee, 2000; Rheingold, 2000) and acting according to community norms and values is considered the most suitable and credible strategy. It would appear that cooperation with a creative online community requires others-orientation and less striving for immediate returns on the part of the company. The congruency between company and community culture, communication and action may be decisive for successful consumer-producer relationships on the Internet.

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