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# ONLINE DISCUSSION BOARDS FOR TECHNICAL SUPPORT: THE EFFECT OF TOKEN RECOGNITION ON CUSTOMER CONTRIBUTIONS

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## Abstract

*As firms in the information technology (IT) industry create increasingly complex products and face escalating service demands, they resort to customer peer-based solutions such as discussion boards to contain service costs. In discussion boards, customers post questions about products and receive answers from their peers. The sustainability of discussion boards depends on attracting volunteers who are willing to contribute answers to posted questions. Many IT firms use token recognition, such as titles, profiles, or lists of top 10 contributors, to motivate customer contribution. However, little is known about the effects of such incentives. By studying half a million postings collectively from the technical support discussion boards of four different IT companies, we find that some incentives can cannibalize socially based processes and reduce customer contribution. Our findings have implications for service firms as they strive to increase customer knowledge coproduction in service activities.*

**Keyword:** Customer self-service, online community, probit model, service strategy

## Introduction

Internet technologies have profoundly changed technical support in the information technology (IT) industry (Hallowell 2002; Keefe 2003; Xue and Harker 2002). Technical support services entail providing customers technical advice (e.g., how to install software on a PC) so that they can “incorporate a given product into their work environment” (Das 2003, p. 416). Internet-based discussion boards allow customers to become producers of technical support knowledge. The discussion boards allow customers to post questions and receive answers from fellow customers; then the discussions are archived and classified on a firm’s servers for future reference. Regardless of the number of users, the total cost of establishing and maintaining boards is largely fixed.

A resource-based model of online social structures suggests that unless provided with economic and/or social benefits, customers will not contribute to such forums (Butler 2001). In technical support discussion boards, customers benefit primarily by having their questions and those of others answered, but if there is not a high likelihood of contributions (i.e., answers to questions), customers will cease to post questions. Hence, without contributions, the board will wither away. Our research question examines how different motivational schemes affect customer contributions.

Two popular strategies to increase the likelihood of contribution are (1) having a firm’s technical support staff and other employees respond to posted questions from time to time and (2) rewarding customers who frequently respond to posted questions (Kim 2000). When a firm’s technical staff responds to questions, the hope is that customers will reciprocate by answering questions and hence increase the overall knowledge base.

In this paper, we examine the second strategy: motivational schemes to increase customer contributions. This may involve rewards or token recognition to frequent contributors. A customer may get elite status that provides both recognition for past contributions and an incentive for future contributions. For example, Dell Computer Corporation dubs its standard discussion board users *Forum Members* and its active users with more than 200 postings *Forum Regulars*. Incentives are justified based on the economic theory that they increase customers' utility for contributions.

These token incentives may unexpectedly undermine contributions from certain groups of customers. People may be motivated to share with others due to a sense of social norm or social identification, not necessary in return for personal gain. As extrinsic types of reward, incentives are known to crowd out intrinsic rewards and encourage competitive actions and noncooperation (Deci et al. 1999).

Our research question is how and why different motivational schemes affect customer contributions in discussion boards. We find that the recognitions have both positive and negative effects on social structures, supporting Butler's (2001) argument that many design choices and incentive schemes in online communities are double-edged swords. Our findings have important implications for IT firms as they strive to increase customer involvement in peer-based service networks.

The rest of the paper is organized as follows. The next section introduces alternative theoretical perspectives. We then outline the methodology and present the results on four different companies' discussion boards. The paper concludes with a discussion of results and implications for future work.

## Theoretical Foundations

Research on online social structures (Butler 2001; Fulk et al. 1996; Wasko and Faraj 2000) suggests that both economic and social mechanisms influence contributions. Specifically, self-interest, reciprocity, and identity are three core concepts associated with voluntary contributions in shared databases and public forums. We review economic utility theory, social exchange theory, and social identity theory to shed light on why people contribute voluntarily.

### *Economic Theory*

Economic models of utility operate purely on rationality principles. A person will contribute only if the benefits outweigh the costs. In collective settings such as discussion boards where there are no incentives to contribute, and hence no possibility of self-interested action, the equilibrium prediction is of no contribution (Olson 1965).

Incentives increase the benefits. Incentives can be various tangible and intangible returns valued by the contributor. Although it is not unheard of some discussion boards to provide financial benefits (e.g., corporate gifts to top contributors), the boards are more likely to use various recognitions and awards for contributions. Some discussion boards grant special titles, like "expert," to users who have exceeded a certain number of contributions. These titles reward contributors with membership in designated groups (experts). While the titles often imply high quality, almost all recognition is based on the quantity of contributions instead of their quality. All in all, the economic theory suggests that with incentives, contributions increase. Hence, we propose:

**P1a: User contribution increases with incentives provided by discussion boards.**

Some incentives can create competition among customers. One way for discussion boards to stimulate competition on contributions is to have lists of weekly or daily top contributors. Such lists can give contributors a strong incentive to compete against others to make the list. For example, Wasko and Faraj (2000) report that people participate in online forums because it enhances their standing in the profession. Hence, we propose:

**P1b: User contribution increases with other users' contribution level with competitive incentives.**

### *Social Exchange Theory*

Social exchange theory—with roots in psychology, sociology, and anthropology—argues that people will contribute not because of benefits from incentives per se, but because of benefits resulting from what is received in return, or future reciprocity (Bearman

1997; Blau 1964). People make contributions as long as others are believed to reciprocate; reciprocity is not necessarily limited to responding in kind to what was received (Ekeh 1974).

Discussion boards promote social exchanges between those customers posting questions and those providing answers; in other words, a customer will help another customer if he feels that some others will feel obligated to answer his posted questions (e.g., Butler 2001; Fulk et al. 1996; Wasko and Faraj 2000). Of course, a contributor cannot be certain whether others will reciprocate because social exchanges are governed by incomplete and informal social contracts (i.e., ambiguity of exchange), not legal ones as in economic exchanges. Social exchange theory argues that the expectation of reciprocity motivates individuals to contribute above and beyond the equilibrium predicted by economic models of utility (Blau 1964).

Social exchange theory distinguishes between restricted (or direct) exchange and generalized (or indirect) exchange. A restricted exchange is one in which two people exchange resources directly; namely, one person gives resources contingent on the resources given by the other person (Blau 1964). In contrast, generalized exchanges involve more than two people: there is no one-to-one reciprocity between them (Levi-Strauss 1969; Uehara 1990). In generalized exchanges, users may contribute to and receive benefits from different parties. One person's resources benefit another person, but that other person will reciprocate with a third person. Reciprocation is indirect or unilateral (Takahashi 2000). In generalized exchanges, the level of reciprocal behavior is expected to be somewhat less than in restricted exchanges because of diffused responsibility (Buchan et al. 2002).

The psychological mechanisms underlying reciprocity are complex. Reciprocity is often related to the prevailing social norm and such norms can be highly culture- and institution- specific (Takahashi 2000). In some cultures, those who receive contributions and are known to have received something of value will reciprocate to avoid being reprimanded. Others present the view that reciprocity arises from receivers wanting to reward the givers of resources for having taken a risk (Snijders and Keren 1999). In either situation, reciprocity reduces the uncertainty that others will return the favor. Reciprocity is also associated with emotional buzz—positive feelings and energy as people engage in helping others (Lawler et al. 2000). All in all, social exchange theory suggests that the key to increasing customer contribution is to increase other customers' contributions. Hence, we propose:

**P2a: User contribution increases with other users' contribution level.**

Others will feel obliged to reciprocate as long as the contributions are useful, timely, and helpful to the community. Failure to reciprocate is perceived by others as opportunistic and will decrease others' contributions. Also, the type of motivation that drives contribution may have an effect. Extrinsic incentives are known to crowd out users' intrinsic incentives to contribute, thereby decreasing user reciprocity. Similarly, Wasko and Faraj (2000, p. 170) report that "members who act out self-interest by exploiting the community to show-off expertise, or put down other members have a negative impact on other member's willingness to contribute." Hence we propose:

**P2b: User reciprocity decreases with others' behavior motivated by extrinsic incentives.**

### ***Social Identity Theory***

Social identity theory links others' contributions to the way that discussion boards help members define and maintain their social identity (Hogg and Abrams 1988; Tajfel and Turner 1979). Interdependence is present, but it relates to how a customer identifies with the other customers rather than with the act of exchange itself. In social identity theory, a sense of unity among customers engenders cooperation and hence motivates contribution.

People derive a sense of self from the entities to which they belong and/or participate and this identity affects how they respond and act (Hogg and Terry 2000). Social identity refers to "the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership" (Tajfel 1972, p. 292, in Hogg and Terry 2000). Prior research has found that "even ad hoc categorization of individuals into mutually exclusive groups is sufficient to create a bias toward one's group" (Buchan et al. 2002, p. 177). This type of psychological group formation can be a powerful motivator to contribution (Tyler 1999).

Social identity is generated through self-categorization. People categorize each other into "in-group" and "out-group" based on perceived similarities (we) and differences (they) (Brewer and Brown 1998; Hewstone et al. 2002). Those who are placed into the same category will no longer be considered individually but depersonalized into one entity or in-group. The same is true of those in out-group. Self-categorization generates group-like thinking and behavior. Those who are in the same in-group category are treated favorably, and those in a different category, or in an out-group, are less likely to receive favorable treatment.

The in-group and out-group memberships are not static and objectively determined. Rather, the memberships are highly dynamic and depend on what is salient to the person in a particular context and moment in time. Categorization can occur without specific knowledge of other members in the group (Hogg and Terry 2000).

Categorization is expected to be particularly strong in computer-mediated contexts because communication in such a setting masks individuating information of self and others (Lea and Spears 1992). The more limited the cues on others, the more people are likely to stereotype and over-attribute, and the more they tend to assume similarity with the in-group and dissimilarity with the out-group (Lea and Spears 1992). Rivalry and competition is expected particularly when differences in power, status (i.e., social distance), grows between the in-group and the out-group (Buchan et al. 2002).

**P3a: User contribution increases with in-group members and decrease with out-group members.**

The strong stereotyping of others to groups may be eased by the display of identifies of the contributors. Discussion boards may allow customers to include personal user information along with their postings. Such personalized profiles give visibility to the unique characteristics of contributors, and thus might help to offset the decrease of contributions with out-group members.

**P3b: Contributions with out-group users are facilitated by user information.**

To recap, self-interest, reciprocity, and group formation can all motivate voluntary contributions. Some discussion boards combine two or more of these motivational sources to encourage greater levels of user contributions. In the next section, we examine patterns of customer contribution in technical support discussion boards that vary in their motivational schemes.

## **Methodology**

### ***Research Design and Selection of Discussion Boards***

We analyze multiple companies' boards to explore how and why different motivational schemes affect customer contribution. The study design used theoretical replication logic (Yin 1994). That is, each company included in the study deployed a different motivational scheme in its boards; different companies were expected to be associated with different results, but for predictable reasons. We selected four different IT companies' boards for analysis; three of them corresponded to the three types of motivational schemes and one had no identifiable motivational scheme. In choosing the discussion boards, we used the following criteria:

- They must have been in operation for at least 52-weeks to ensure enough variances in user customer contributions over time to detect different patterns if they exist
- They must have received more than 100 postings per week to generate enough data points for the regression models
- They must follow the same motivational scheme over the data collection period

By choosing discussion boards in the same industry and with similar size and characteristics, we are able to compare user behavior cross-sectionally and contribute the differences in user behavior largely to difference in their motivational schemes. Based on the above criteria, we identified the discussion boards for two hardware firms and two software firms.

#### **Corel Corporation**

Corel Corporation is a company well-known for its graphic (e.g. CorelDraw) and productivity (e.g. WordPerfect) software. On October 31, 2002, Corel operated 23 discussion boards for technical support with more than 150,000 accumulated postings between 2001 and 2002. Corel used newsgroups to manage its discussion boards without token incentives such as personal profiles or recognitions to its customers. Corel served as the base case.

#### **Pinnacle Systems Corporation**

Pinnacle Systems Corporation is a leading company in digital video broadcast. As of October 31, 2002, Pinnacle Systems operated 135 discussion boards for technical support which had accumulated more than 40,000 postings between 2001 and 2002.

Pinnacle Systems allowed users of its discussion boards to establish individualized profiles. Profiles contained customers' past contributions, experiences in specific IT systems, their technical certifications, and often Web addresses to their personal or small-business Websites.

**Dell Computer Corporation**

Dell Computer Corporation is a leading computer manufacturer and one of the pioneers in using technical support discussion boards (Keefe 2003). As of October 31, 2002, Dell operated 102 discussion boards for technical support which had accumulated over 1 million postings between 1999 and 2002. Dell grouped discussion boards into 16 forums according to Dell system type, and within each forum, Dell organized message boards by the types of software or hardware. The study originally called for collecting all postings on all Dell discussion boards between 2000 and 2002, but due to technical difficulties and Dell's restriction on our Web activity, data were instead collected from a sample of 18 discussion boards randomly selected from the 102 technical support discussion boards (delltalk.us.dell.com). Dell used recognition as its motivational scheme. It categorized users into two large groups: forum members for occasional users and forum regulars for regular users.

**Hewlett-Packard**

After its recent merger with Compaq, Hewlett-Packard (HP) had become the largest computer manufacturer in the United States and a large provider of discussion boards. As of October 31, 2002, HP operated 35 discussion boards for technical support with close to 2 million postings. The study was conducted on five discussion boards for Compaq computers to be consistent with other retail-customer oriented discussion boards used in this paper.

HP adopted Dell's strategy of providing recognition to users in its discussion boards. In addition, HP also maintained a real-time list that listed names of its top users. This list created competition among regular users of HP's discussion boards.

**Table 1. Discussion Boards in the Study**

<b>It Companies</b>	<b>Incentive Scheme</b>	<b>Operation Duration</b>	<b>Total Postings</b>	<b>Product</b>
<b>Corel</b>	None	2001-2002	158,903	Software
<b>Pinnacle</b>	Individualized Profiles	2001-2002	43,544	Software
<b>Dell</b>	Recognition	2000-2002	279,761	Hardware
<b>HP</b>	Recognition + Competition	2001-2002	61,938	Hardware

**Data Collection**

We collected customer postings using software agents. The software agents recorded not only information on customer postings, but also the relationship among postings by keeping track of discussion threads and a posting's position within a thread. Discussion thread was a common structure prevalent in online discussion boards and newgroups. It maintained the sequence of a series of postings that were posted as replies to each other. For each posting, the software agents retrieved its author ID, its posting time, the unique ID for the discussion thread that contained the posting, and the posting's position within that thread. For all four IT companies, the unit of analysis was a customer/user contribution in a discussion board.

**Measures**

We derived the following measures for each posting: (1) nature of the posting (question or answer), (2) group identification of the customer, (3) customer contribution for each customer group, and 4) total firm contribution in previous week.

## Nature of Posting

The nature of a posting was automatically determined by the software agents by looking at its position within a discussion thread. Any posting that started a new thread was classified as a question. The nature of subsequent postings depended on their authors. If a subsequent posting was submitted by the question author, the posting was likely a clarification question, a follow-up question or a thank-you note. As these postings were an integral part of the original question, we discarded such postings from the data set. On the other hand, if a subsequent posting was submitted by a customer/user other than the question author, we classified it as an answer unless the author had more than one posting in the same discussion board, in which case only one posting was counted as an answer. Our approach ignored the fact that certain postings by customers other than the question author could be questions as well. For example, a customer might echo the original question by indicating that he had a similar question. To test the significance of this potential bias, we manually scanned through 974 postings in 400 threads. The occurrence of such postings was low, less than 2 percent.

## Group Identification of Customers

For the two discussion boards with recognition schemes (Dell and HP), customer groups were automatically categorized by the discussion boards and group memberships were visible to all users. Dell divided users into Forum Members and Forum Regulars. HP identified frequent users with special icons. For consistency, we renamed Dell's Forum Member and HP un-iconed users as OccasionalUsers, and renamed Dell's Forum Regular and HP's frequent users as RegularUsers. For the other two discussion boards, no mechanisms were provided by the discussion boards to categorize users into different categories. To make the analysis comparable across cases, we created the same OccasionalUser/RegularUser categories for the other two discussion boards (Coral and Pinnacle). We defined RegularUsers as those customers with more than 200 contributions.

## Customer Contribution for Each Customer Group

Customer contributions for each customer group were assessed in terms of how a customer responded to changes of overall customer contributions in in-groups and out-groups. A positive relation indicated reciprocity. We estimated customer contribution rate as the number of customer contributions divided by number of customer postings for a given customer group in the week prior to the post time of a given posting. That is, contribution rate for OccasionalUser was calculated by total answers posted by OccasionalUser in the week divided by total postings by OccasionalUser in the same time period. Likewise, RegularUser contribution was calculated as total answers posted by RegularUser in the week divided by total postings by the same users in the same time period.

## Firm Contribution

Firm contributions may decrease customer contribution. We therefore incorporated firm contribution in our analysis as a control variable. The firm contribution was calculated as total answers posted by the sponsoring firm in the week prior to the posting time divided by total answers posted in the same period.

## Analysis Model

The standard models for analyzing consumers making choices are probit and logit models. The two models are almost equivalent in practice (Maddala 1983). We use the probit model to estimate consumers' incentive of contribution. Similar results can be derived using the logit model as well.

The following probit models are estimated for two categories of users for their in-group and out-group reciprocity:

$$\text{probit}(\text{Contribution}_{\text{OccasionalUser}}) = \beta_0 + \beta_1 \text{FirmContribution}_{\text{LASTWEEK}} \\ + \beta_2 \text{OccasionalUserContribution}_{\text{LASTWEEK}} + \beta_3 \text{RegularUserContribution}_{\text{LASTWEEK}}$$

and

$$\text{probit}(\text{Contribution}_{\text{RegularUser}}) = \gamma_0 + \gamma_1 \text{FirmContribution}_{\text{LASTWEEK}} + \gamma_2 \text{OccasionalUserContribution}_{\text{LASTWEEK}} + \gamma_3 \text{RegularUserContribution}_{\text{LASTWEEK}}$$

$\beta_2$  and  $\gamma_3$  therefore provide measures for in-group reciprocities of two categories of customers, and  $\beta_3$  and  $\gamma_2$  provide measures for out-group reciprocities of two categories of customers.

**Results**

We discuss the results from the vantage points of economic theory, social exchange theory, and social identity theory. The results are established based on comparison of user behaviors across discussion boards with different motivation schemes. To save space, we do not report on the descriptive statistics.

**Case 1: Corel Corporation (no incentives)**

Table 2 presents the results of user reciprocity in Corel’s discussion boards. Since Corel did not provide any extrinsic incentive to increase contributions, economic theory (P1a) proposes that users will not make any contribution to the discussion boards and that reciprocity coefficients will be zero. On the other hand, social exchange theory (P2a) predicts that user contributions increase with increased contributions from other users, i.e., positive reciprocity coefficients. Social identity theory further recognizes group formation as one of the fundamental human behaviors in social contexts. Although Corel neither recognized customers with titles nor categorized them into different groups, previous research in social identity theory found that people will implicitly develop social identity and categorize others based on minimal social interactions (Hogg and Terry 2000). Therefore, higher reciprocity may be likely among customers with similar backgrounds (P3a)

The results are consistent with the propositions derived from social exchange theory (P2a) and social identity theory (P3a). Occasional users in Corel’s discussion boards have strong in-group reciprocity (1.37), but weak out-group reciprocity (-0.36). Likewise, regular users on the discussion boards have strong in-group reciprocity (1.93), but weak out-group reciprocity (0.58).

**Table 2. Customer Reciprocity in Core’s Discussion Boards**

	<b>Intercept</b>	<b>Firm Contribution</b>	<b>OccasionalUser Contribution</b>	<b>RegularUser Contribution</b>
<b>OccasionalUser</b>	-0.16 (0.30)	-0.84* (0.25)	<b>1.37** (0.19)</b>	-0.36 (0.39)
<b>RegularUser</b>	-0.62 (0.48)	0.40 (0.42)	0.58 (0.33)	<b>1.93** (0.64)</b>

\*The numbers are beta values estimated by the probit model with standard deviation reported in parentheses.

**Case 2: Pinnacle Systems Corporation (personal profiles as incentive)**

Table 3 presents customer reciprocity in Pinnacle’s discussion boards. The results are different from Corel’s case. Pinnacle provides its users with personalized profiles which often contain details of a customer’s past contributions, experiences with IT systems, IT certifications, as well as personal/business Web address. Small business owners also use these profiles as advertisements for their businesses. Economic theory (P1a) predicts that these incentives increase the overall contribution, however, the reciprocity coefficients will remain at zero. On the other hand, given that users are more likely to be contributing because of the extrinsic incentives to gain exposure, social exchange theory predicts reciprocity coefficients toward this group of users to be less positive compared to scenarios without incentive (P2b). Personalized profiles may also mitigate stereotyping and discrimination against the out-group, weakening the effect of social identity. In the extreme case, each user may identify himself as a unique group. Social identity theory suggests a smaller difference between in-group and out-group reciprocity (P3b).

The patterns are consistent with propositions derived from social exchange theory and social identity theory (P2b and P3b). Pinnacle’s users appear to have very little, if any, bias toward in-group reciprocity. The difference between in-group and out-group reciprocity of occasional users is only 0.46, compared to a 1.73 difference in Corel’s case. Likewise, the difference between



in-group and out-group reciprocity of regular users is just 0.29, compared to a 1.35 difference in Corel's discussion boards. Reciprocity may be dampened because of economic utility with regular users. The in-group reciprocity level for regular users decreases from 1.93 in Corel's case to 0.31 in Pinnacle's discussion boards. The reciprocity level for occasional users also decreases from 1.37 to 0.98. The decreases in occasional users are smaller, perhaps because they are less likely to be motivated by incentives.

**Table 3. Customer Reciprocity in Pinnacle's Discussion Boards**

	<b>Intercept</b>	<b>Firm Contribution</b>	<b>OccasionalUser Contribution</b>	<b>RegularUser Contribution</b>
<b>OccasionalUser</b>	-1.00** (0.24)	0.15 (0.29)	<b>0.98** (0.15)</b>	<b>0.52* (0.26)</b>
<b>RegularUser</b>	0.65* (0.34)	-0.72 (0.41)	0.02 (0.20)	0.31 (0.39)

\*The numbers are beta values estimated by the probit model with standard deviation reported in parentheses.

### Case 3: Dell Corporation (recognition as incentive)

Table 4 presents the result of consumer reciprocity in Dell's discussion boards. Dell awards token recognition to any user who makes more contributions than a predetermined threshold. Economic theory again predicts that users will be more interested in making contributions although such contributions will not be affected by contribution level of other users. Token recognition categorizes users into two groups: OccasionalUsers who do not receive recognition and RegularUsers who receive recognition. Because regular users are more likely to be contributing due to self-interested gains from recognition, social exchange theory predicts reciprocity coefficients to be less positive for this group of users compared to scenarios without such incentive, while reciprocity coefficients among occasional users will not be affected (P2b). Providing token recognition to regular users also changes predictions of social identity theory. Because the regular users are more driven by recognition, social identity theory predicts a weak difference between RegularUsers' in-group and out-group reciprocity (P3a).

The results are again consistent with propositions derived from social identity theory and social exchange theory. A regular user's in-group reciprocity decreases significantly from 1.93 in Corel's case to 0.58 in Dell's discussion boards. This decrease is due to contributions becoming less of a function of other users' contributions and more of economic utility arising from the incentive itself. This explanation is further confirmed by observing that an occasional user's reciprocity does not change, because their contributions do not receive token recognition. In addition, the difference between in-group and out-group reciprocity of regular users decreases from 1.35 in Corel's case to 0.79 in Dell's discussion boards as predicted by social identity theory.

**Table 4. Customer Reciprocity in Dell's Discussion Boards**

	<b>Intercept</b>	<b>Firm Contribution</b>	<b>OccasionalUser Contribution</b>	<b>RegularUser Contribution</b>
<b>OccasionalUser</b>	-0.87** (0.12)	-0.35** (0.07)	<b>1.25** (0.10)</b>	0.09 (0.13)
<b>RegularUser</b>	1.25** (0.30)	-0.64** (0.16)	-0.21 (0.33)	<b>0.58* (0.31)</b>

\*The numbers are beta values estimated by the probit model with standard deviation reported in parentheses.

### Case 4: Hewlett-Packard (recognition and competition as incentives)

Table 5 presents the results of user reciprocity in HP's discussion boards. Since HP adopts both token recognition and competition in its discussion boards, economic theory predicts that regular users will compete against each other; therefore, their contribution will increase with contributions from other regular users (P1b). This effect is phenomenally the same as reciprocity effect, although it resulted from a completely different cause. Because of the strong incentive of competition, social exchange theory suggests that the in-group reciprocity effect of the regular users will be small (P2b). However, this real reciprocity effect cannot be tested independently from the competition effect. In addition, social exchange theory indicates that the intergroup reciprocity effect between regular users and occasional users will be small due to the strong incentive of competition. Competition among regular users also changes predictions of social identity theory. It increases social distance between the two groups of users.

Social identity theory predicts a strong difference between in-group and out-group reciprocity compared to Dell’s discussion boards (P3a).

The results from HP’s discussion boards are consistent with propositions derived from all three theories. First, we notice that regular users show strong in-group reciprocity. A regular user’s in-group reciprocity increases significantly from 0.58 in Dell’s case to 1.30 in HP’s discussion boards. This strong reciprocity may be due to the competition effect. At the same time, intergroup reciprocity decreases significantly as predicted by social exchange theory. Finally, as predicted by social identity theory, the difference between in-group and out-group reciprocity further widens to 2.19 and 2.11 respectively for the two categories of users.

**Table 5. Customer Reciprocity in HP’s Discussion Boards**

	<b>Intercept</b>	<b>Firm Contribution</b>	<b>OccasionalUser Contribution</b>	<b>RegularUser Contribution</b>
<b>OccasionalUser</b>	-0.63** (0.23)	-0.25* (0.13)	<b>0.99** (0.14)</b>	<b>-1.20** (0.20)</b>
<b>RegularUser</b>	1.16* (0.66)	-0.89** (0.30)	<b>-0.81* (0.32)</b>	<b>1.30* (0.60)</b>

\*The numbers are beta values estimated by the probit model with standard deviation reported in parentheses.

Table 6 summarizes the propositions and the results with the discussion boards.

**Table 6. Summary of Theoretical Foundations and the Four Discussion Boards**

<b>Theoretical Foundation</b>	<b>Proposition</b>	<b>Corel</b>	<b>Pinnacle</b>	<b>Dell</b>	<b>HP</b>
<b>Economic Theory</b>	a. User contribution increases with incentives provided by discussion boards	No incentive	Some incentive	Some incentive	Strong Incentive
	b. User contribution increases with other users’ contribution level with competitive incentives	No competition	No competition	No competition	With competition
<b>Social Exchange Theory</b>	a. User contribution increases with other users’ contribution level				
	b. User reciprocity decreases with others’ behavior motivated by extrinsic incentives	No extrinsic incentive	Some extrinsic incentive	Some extrinsic incentive	Strong extrinsic incentive
<b>Social Identity Theory</b>	a. User contribution increases with in-group members and decreases with out-group members	No information	Detailed information	Some information	Some information
	b. The contributions with outgroup users are facilitated by user information	Some dissimilarity	Some dissimilarity	Some dissimilarity	Strong dissimilarity
<b>Conclusion</b>		Strong reciprocity	Some reciprocity	Some reciprocity	Weak reciprocity
		Strong out-group bias	No out-group bias	Some out-group bias	Strong out-group bias
					Strong competition

## Discussions and Limitations

The study has a number of limitations. We are restricted to studying discussion boards in the IT industry. As a result, implications derived from our study must be interpreted within the context of IT users who might behave differently from the general public. In the IT industry, we chose four firms with different incentive schemes, and compared user in-group and out-

group reciprocity across the four firms. Ideally, we need to control heterogeneities among the firms whose discussion boards are being examined. Other factors may bring bias to the results. Particularly, differences in customer experience and product complexity may influence customer behavior in these discussion boards. These issues need be addressed in future studies with a larger set of companies.

We use a simple method to categorize postings into contributions and questions based on position of the posting in a message thread. This method ignores the content of the posting and might lead to misclassifications. These methodological issues need to be addressed in future studies with more intelligent software or with more human intervention.

Despite the limitations of our study, the results provide some insight. Economic theory has long held the view that external incentives and rewards motivate behavior. However, as Benabou and Tirole (2003) argue, such external incentives and rewards can be counterproductive. This is because extrinsic incentives can crowd out people's intrinsic incentives and may decrease rather than increased the desired behavior in the long run. The findings in this paper complement the results of Benabou and Tirole by suggesting that extrinsic incentives can reduce customers' intrinsic incentive by promoting peers' opportunistic behaviors and increasing social distance among users. If replicated, these results can provide refinement of economic modeling.

Social exchange theory recognizes that people exhibit reciprocity in their exchanges. Reciprocity can be heterogeneous among network participants. Our results suggest that generalized reciprocity is sometimes limited to peers with whom one can identify.

Social identity theory describes how a customer identifies with the other customers. Our results suggest that customers can establish social identity with weak cues and limited information. Our results also provide a simple methodology to quantify existence of different social identities within seemingly homogenous discussion boards. This approach allows us to have an understanding of how social identities are influenced by token incentive schemes.

Our research also provides managerial implications. Discussion boards represent a new era in service management. While traditional service management only considers service provided by firms (Chase 1978), advancements in information technology, particularly the Internet, enable many services to be provided by customers themselves (Heskett et al. 1990). Discussion boards push the idea further by noting that customers not only serve themselves, but provide service to other customers as well.

To increase customer contributions and thus their services to other customers, business managers naturally resort to external incentives. Our study questions such a move. The extrinsic incentives may crowd out customers' intrinsic incentives to contribute and, in turn, reduce customer reciprocity. Extrinsic incentives can change social structures and social identity, and thereby negatively impact customer reciprocity. Overall, it is important for business practitioners to understand the long-term impact of extrinsic incentives on customer reciprocity and, where appropriate, emphasize social processes over extrinsic incentives.

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