

1-1-2010

AN EMPIRICAL STUDY OF CUSTOMER CONTRIBUTION IN ONLINE BRAND COMMUNITIES FOR INNOVATION

Mingguo Li

National University of Singapore, liminggu@comp.nus.edu.sg

Seung Hyun Kim

National University of Singapore, kimsh@comp.nus.edu.sg

Follow this and additional works at: http://aisel.aisnet.org/icis2010_submissions

Recommended Citation

Li, Mingguo and Kim, Seung Hyun, "AN EMPIRICAL STUDY OF CUSTOMER CONTRIBUTION IN ONLINE BRAND COMMUNITIES FOR INNOVATION" (2010). *ICIS 2010 Proceedings*. Paper 63.
http://aisel.aisnet.org/icis2010_submissions/63

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 2010 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

AN EMPIRICAL STUDY OF CUSTOMER CONTRIBUTION IN ONLINE BRAND COMMUNITIES FOR INNOVATION

Research-in-Progress

Mingguo Li

Department of Information Systems
National University of Singapore
13 Computing Drive
Singapore 117417
liminggu@comp.nus.edu.sg

Seung Hyun Kim

Department of Information Systems
National University of Singapore
13 Computing Drive
Singapore 117417
kimsh@comp.nus.edu.sg

Abstract

Recent years have witnessed the emergence of online brand communities for innovation, whereby customers can contribute their innovation ideas to the companies. The central issues for managers who are interested in harnessing this new form of community include determining which customers may contribute more innovation ideas and understanding how they can further promote customers' contributions. Using the resource-based theory of social structure, we propose hypotheses on the factors that influence customer's contribution of innovation ideas, such as active group size, tenure in the community, connection to social network site (SNS), and interest concentration. Our findings from a preliminary analysis of panel data suggest that active group size and tenure in the community have a negative effect on customer's likelihood of making a contribution while connection to SNS and interest concentration encourage a higher likelihood of contribution. The managerial implications and future directions of the study are discussed.

Keywords: Online Brand Innovation Communities, Dell IdeaStorm, Customer Contribution, Social Network Site, Group Size, Interest Concentration, Tenure

Introduction

Social websites that focus on products and brands (i.e. online brand communities) have taken off in recent years. An online brand community strategy has helped companies such as Harley-Davidson to transform themselves into leading global brands. Members of a brand community identify themselves with the brand and share product experiences with each other. More recently, some online brand communities have evolved into a new form of community called innovation communities. Besides such benefits as customer loyalty and marketing efficiency intended by brand communities (Fournier et al. 2009), members of brand communities have become a valuable source of innovation for companies based on a corporate-created Web platform (Füller et al. 2008). The importance of such a shift has been demonstrated by the fact that innovations from lead users generate more sales potential than traditional market research techniques (Lilien et al. 2002). As one of the pioneers to do so, Dell has launched IdeaStorm, a company-initiated online brand community that encourages customers to participate in innovation process in 2007. International coffee chain Starbucks has also initiated its online brand community to collect innovation ideas from its customers. The IdeaExchange of Salesforce.com established an online forum to listen to customers' innovative ideas in a business-to-business setting. By adopting ideas from their customers, Dell has introduced new features and options to its products, such as installing Linux as operating system; Starbucks implemented a mobile payment system for its customers and created new taste coffee and cookies.

Practitioners and scholars have been concerned with how to make the best use of online innovation communities for the firms' benefit. The central issues for managers who are interested in leveraging this new form of community are to identify which customers are more likely to contribute innovation ideas and how they can further promote customers' contributions. More specifically, should an innovation community keep recruiting new users to promote more contributions? Should an online innovation community allocate resources and provide more support to maintain the users with longer tenure in the community? Will managerial interventions such as connection with social network sites (SNS) be helpful in keeping the community active?

Our model uses the resource-based theory to examine the effects of four important research variables, two individual factors (customer's tenure in the community and interest concentration) and two community factors (active group size and connection to social network site), on a customer's likelihood of contributing an idea in the particular month. On customer contributions of innovation ideas, we test our model using panel data collected from the Dell's IdeaStorm. In order to select users whose participation records are enough for analysis, we sampled 446 users who have contributed innovation ideas or comments in the community more than once and have records for at least 20 months.

Our research is designed to extend past research in the following three ways. First, different streams of literature tend to make two possibly conflicting hypotheses: customers' likelihoods of making a contribution may increase or decrease when the community size grows. Our study suggests that in an innovation community, the group size has a negative effect on the individual's contribution. Second, we contribute to the research on the relationship between tenure in the community and online community participation. Tenure in the community is found to be an important factor in individual's contribution such that a customer's likelihood of contribution to innovation community actually decreases with their tenure. Thirdly, we highlight how connection to social network site, Facebook.com in our study, and personal interest concentration can influence the likelihood of individuals' contribution. Prior studies have found that members' motivation for making contributions to communities are closely tied with the types and contexts of online communities. Overall, our work intends to contribute to an enhanced understanding of contributors of innovation ideas and how to promote such contributions by considering their unique features. We do not intend to provide an exhaustive list of the factors that determine customers' contribution in this study. Instead, we focus on the two community factors and two individual factors that are of practical implications due to their direct observability by community managers.

The rest of the paper is organized as follows. We present the relevant literature, theories and hypotheses in the next section. We then describe the data and methods for our analysis. The results are written in the following section. We then discuss the theoretical and practical implications of our results, followed by concluding remarks.

Literature Review

In market competition, innovation is a key process to gain competitive advantage. Innovation can stem from the manufacturer, user, or other sources (von Hippel 1988). Customer collaboration and participation in innovation is

increasingly important for companies. There are various ways that firms can engage customers as sources of innovation, such as providing the customers with toolkits to create their own innovations (von Hippel et al. 2002), talking to lead users during the innovation process (Lilien et al. 2002), providing virtual customer environments (Nambisan et al. 2008), or using brand communities as sources of innovation (Füller et al. 2008). Customers who contribute innovation ideas are driven by excitement rather than pure need for product improvement (Füller et al. 2007). A brand community is defined as “a specialized, non-geographically bound community based on a structured set of social relations among admirers of a brand.” (Muniz et al. 2001) Brand communities help the firms achieve customer loyalty and marketing efficiency (Fournier et al. 2009).

Prior studies have examined the factors that influence contributions of community members in various contexts. Using the (e-mail)-based Internet listservs data, Butler (2001) has examined the effect of community membership size on communication activities by referring to the resource-based theory. Wikipedia contributors are found to be less likely to contribute when the contributor group size decreases (Zhang et al. 2010). In a knowledge sharing community, Kankanhalli et al.(2005) study the determinants of user contribution to electronic knowledge repositories drawing on social exchange theory and social capital theory. Personal factors, including reputation, reciprocity and community interest (Wasko et al. 2005) and social factors such as social affiliation and professional self-expressions act as key motivations (Subramani 2004). In addition, user experiences, recognition from the site and individual attributes (Chiu et al. 2006), perceived identity and satisfaction with community (Gu et al. 2007) are related to knowledge contribution behaviors. Motivation to contribute knowledge is also related to the validation process of knowledge contribution (Durcikova et al. 2009). Besides, perceived organizational climate of fairness, innovativeness and affiliation also has a positive impact on knowledge sharing within organizations (Bock et al. 2005). In a virtual investment-related communities, the value of a discussion board to a user is positively related to the number of quality postings on the discussion board (Gu et al. 2007). Social network structure in participation over time has a significant influence on online policy discussion forums (Chua et al. 2007). The situated learning and indemnity construction behaviors were positively linked to sustained participation in open source service networks (Fang et al. 2009).

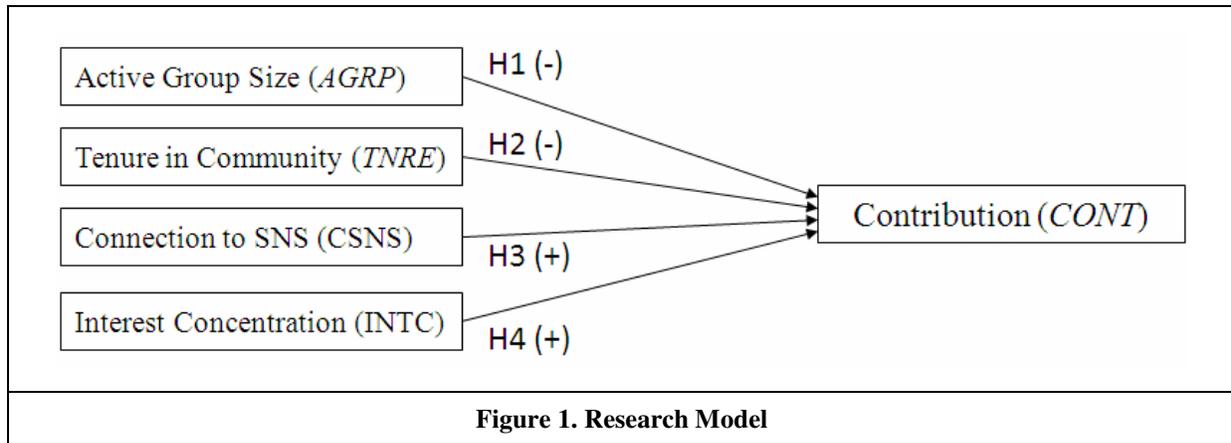
The prior studies have found that members’ motivation for making contributions to communities are closely tied with the types and contexts of online communities. The context of contribution of innovations on online brand community differentiates from other online community contexts in the following ways: first, community members do not know each other personally and their identities are little known. Second, brand plays a central role in this community. Third, contributions on the community are innovation ideas from which others do not receive any direct benefit. Until today little research has been conducted on innovation brand communities to consider their distinct characteristics.

Hypotheses

To answer our question on the drivers of customer’s contribution of innovation ideas, we used the resource-based theory of sustainable social structure as the foundation. According to the resource-based model, a social structure such as a community is sustainable when it can provide access to a pool of resources and support participants’ social processes to benefit from the resources available. In a social structure like an online community, members make contributions, while the social structure provides benefits to the individuals (Butler 2001). The potential benefits must exceed the costs of participation and membership for a social structure to be sustainable (Moreland et al. 1982). The benefits include opportunities to influence people and disseminate ideas, access to better information, and provision of social support. The ability of the social structure to provide benefits to users is determined by the availability of resources such as knowledge, time, energy, and money (Rice 1982). The cost of contribution by community members can be time, energy, financial resources, attention and knowledge (Butler 2001).

As noted earlier, individual customers contribute ideas to a brand community for innovation when the expected benefits exceed the costs of contribution. Specific to such communities, the cost of customer’s contribution in an online brand community includes time and energy to post ideas online and knowledge on the innovation. Customers also benefits from their participation in online brand communities for innovation. They gain knowledge of the brand and are able to disseminate their ideas (Brown et al. 2003). Brand communities provide their members with a network of relationships (Keller 2003). An innovation community is a social structure where multiple relationships co-exist. Relationships in innovation community include those between the brand and the customer, between the firm and the customer, between the product and the customer as well as among the customers (McAlexander et al. 2002). In addition, as members of community identify themselves with the brand (Muniz et al. 2005), they also

benefit from the amelioration of the brand. By contributing to the brand community, members also have the chance to use the products of their preference. Online innovation communities can provide various resources and benefits by supporting members' social processes, which makes the resource-based theory suitable in understanding the determinants of user contribution behaviors in these communities. Figure 1 presents our conceptual research model tested on monthly panel data from a subset of community members. The dependant variable (*CONT*) is binary, i.e. refers to whether contribution occurs in the particular month by a specific individual customer. We do not intend to provide an exhaustive list of the factors that determine customers' contribution to an online brand community for innovation in this study. Instead, we focus on two community factors (*AGRP*, *CSNS*) and two individual factors (*TNRE* and *INTC*) as antecedents of *CONT*, which are of practical implications due to their direct observability by community managers.



Active Group Size

Because members of an innovation community contribute an important part of their assets, the size of the community can be a measure of its resource availability (Butler 2001). Large group size indicates more resources available in the community and thus encourages more contributions. The positive effect of group size on contribution behavior has been studied in different contexts. It was found that the gift given by an individual to a group increases with group size (Andreoni 2007). Wikipedia contributors are less likely to contribute when the contributor group size decreases (Zhang et al. 2010). In a larger online brand community, there are likely to be more members with different expertise who contribute their ideas. These contributors will have a larger size of audience (Fulk et al. 1996), and members will be likely to benefit more from knowledge gain in discussion with other members of the brand community. We focus on the active group size rather than the total group size. First, members of an online innovation community can leave the community at no cost without any indication of termination. In addition, resources available are determined by active users.

On the other hand, size of the online community may also have an adverse effect on its capabilities to convert resources into benefits (Butler 2001). The average share of resources falls when group size increases (Olson 1965). Besides, in a large community, members tend to develop free-riding attitudes and contribute less (Thorn et al. 1987). If the size of community is large, it becomes difficult for individuals to know the rest of group and receive social benefits (Feld 1982). When altruism plays a more important role than social benefits in contribution behavior, the decrease in the average group benefits due to an increased group size has a negative impact on contribution. Thus, individual's contribution decreases with group size (Olson 1965). Such a negative effect of group size on contribution has been found in investment decisions of students (Issac et al. 1988) and volunteering for public services (Bilodeau et al. 1996).

In brand communities for innovation, both positive and negative effects interact and impact on individual's contribution. However, we expect a negative effect to play a more influential role in the community. If the firm is able to implement a limited number of innovations, the expected chance of implementation of a customer's contribution decreases as the community size becomes larger. Since other community members are likely to pay more attention to some popular innovation ideas as the community size increases, the expected benefits of social exchange may also decrease. Although the total amount of resources in an online brand community may grow, the average resource per user decreases if the community size increases. We expect the following hypothesis to hold.

H1. Active group size in the innovation community is negatively related to the likelihood of monthly contribution of innovation ideas by a particular member.

Tenure in the Community

Tenure in the community can be related to increased resources and decreased cost of contribution. Customers create innovation ideas from their experience in using the company's products, which makes contributing an idea less costly as time passes. As a customer gains experience of the community, her cognitive cost of participating in the community becomes lower as well. For instance, individuals with longer tenure were found capable of providing more knowledge contributions to electronic networks of practices as they could develop more cognitive capital (Wasko et al. 2005). As customers can build social capital and achieve reputation over time, more resources will be available for those who spend more time in the community. However, there are stronger reasons to believe that the resources available to customers decrease as tenure in the community increases. Knowledge creation can be limited if individuals lose their interest over time and the community fails to provide resources that satisfy users' changing needs. In fact, only selected ideas contributed by users in online brand communities for innovation are adopted and implemented by the brand. As the main objective of such innovation communities is to contribute innovative ideas, users whose ideas are not adopted will lose their interests and support. Thus, we expect that a negative effect of tenure in an innovation brand community will outweigh a positive effect.

H2. Tenure in the community in the innovation community is negatively related to the likelihood of monthly contribution of innovation ideas by a particular member.

Connection to SNS

Social networking sites (SNS) such as Facebook, MySpace and Friendster allow users to update their profile information, communicate and share interesting ideas, and links with each other. SNS can strengthen personal relationship (McKenna et al. 2002). Users of SNS can find others with similar interests as well as maintain existing social connections (Ellison et al. 2007).

An online brand community for innovation can connect with SNS by introducing a sharing feature which facilitates members to share their activities in the community with contacts in the SNS. Connection to SNS gives the online innovation community an opportunity to expand its influence outside the community. The communication ability is positively related with the benefits provided by the social structure (Butler 2001). Connection to SNS increases the ability of the innovation community to transform its assets into benefits for its members by increasing the communication abilities in the community. Because connection to SNS increases the potential audience size of contributors, contribution to the innovation community is expected to bring the members more benefits from social exchanges and dissemination of ideas. Moreover, connection with SNS enables members to signal to friends their identification with the brand (Boyd et al. 2007). As a potential managerial intervention to enhance more active participation by users, we propose the following hypothesis about the link with SNS.

H3. Connection to SNS in the community is positively related to the likelihood of monthly contribution of innovation ideas by a particular member.

Interest Concentration

In this study, interest of customers is defined as "part of emotional experience, curiosity and monetary motivation" (Silvia 2006). Personal interest has been a major impetus behind scientific discovery and technological development. Interest itself is not a resource in a social structure. However, personal interest has a significant influence on the perceived benefits of the social structure.

Individuals with a stronger interest in the innovation community receive more intrinsic benefits in the information obtained from the social structure and dissemination of their ideas. Because relationships in the online community are based on shared interests (Boyd et al. 2007), individuals with stronger interest in some aspects of the brand community are likely to derive more social benefits in social exchanges. Members of an online brand community share the common passion of the brand (Muniz et al. 2001). Those with stronger interest potentially receive more benefits in contributing innovation ideas in the brand community.

Individual's personal interest can have different attributes, such as intensity, transience and impulsivity (Loewenstein 1994), depth and breadth of interest (Langevin 1971). People with deeper interest have the tendency to

“explore, investigate and understand new objects” (Ainley 1998). People with a larger breadth of interest are expected to “show intellectual curiosity about a diversity of topics” (Jackson 1994). The concentration of interest is a measure based on both intensity and breadth of interest. People who have a more concentrated interest put more attention on one aspect but ignore others. In an online brand community for innovation, customers who have a higher concentration of interest are more interested in one aspect of the brand. Thus we expect that those with stronger interest would exert higher interest concentration, which leads to a higher likelihood of idea contribution due to higher potential benefits from the innovation community.

H4. Interest concentration is positively related to the likelihood of monthly contribution of innovation ideas by a particular member.

Research Methodology

We selected Dell’s IdeaStorm as our research context to study brand innovation communities. Dell is a leading corporation in developing and selling personal computers. Dell launched the Dell IdeaStorm website to collect innovation ideas from its brand community in February 2007. After registration, users of the community can contribute their innovation ideas on IdeaStorm. Each idea can be placed into one of three categories, “Product Ideas”, “Dell Ideas” and “Topic Ideas” by the contributor. Users can also make comments on all the posted ideas and participate in voting on the ideas posted on the website. All the contributed innovation ideas and their comments are made available to the public on Dell IdeaStorm. Around 3% of all contributed ideas are adopted. From customers’ idea contributions, Dell has introduced new features to its products, such as touch screen, options of Linux operating system, and wiki web pages for its customers, etc.

Our data was collected by using web-crawling programs written in Python. The dataset contains ideas and comments posted by Dell IdeaStorm users in the period between February 2007 and November 2009. The dataset consists of the user statistics including their monthly idea contributions, their comments on others’ ideas, the status of contributed ideas (i.e., adopted or not adopted by Dell) in the community. 446 users who have contributed innovation ideas or comments more than one month and have records for at least 20 months were selected. This ensures that we rule out the users who visit the community and leaves immediately without much usage while obtaining a balanced panel dataset. Jointly these users have contributed 3,389 ideas (around 34 percent of all posted ideas) and 33,451 comments and received 35,244 comments from others. Dell IdeaStorm has been connected with Facebook since April 2008. Created in 2004, Facebook is one of the most popular SNSs with more than 400 million active users worldwide as of 2010. Friends of IdeaStorm users who see the shared information on Facebook may visit the IdeaStorm site.

Empirical Model & Variables

Our dependant variable is Contribution ($CONT_{it}$). That is, $CONT_{it}$ is coded as 1 if customer i has contributed in month t . In our model, t indicates the number of months since customer i started making a contribution or comment in the innovation community (i.e., tenure in the community) instead of calendar month. For the contribution variable, we estimate the probability of their contribution by fixed effect panel logistic regression (Greene 2007). In this model, the customer-level unobserved characteristics (i.e., omitted variables) are captured by a customer-specific constant term. Panel logistic model has been applied to explain brand preference (Chintagunta et al. 1991). Logistic regression is used because we are interested in whether customer has contribution in a particular month. The probability density of customer i to contribute innovation ideas in the month t can be written as

$$\Pr(CONT_{it} = 1 | X_{it}) = \Lambda(\alpha_i + \beta_1 \cdot AGRP_{it} + \beta_2 \cdot TNRE_{it} + \beta_3 \cdot CSNS_{it} + \beta_4 \cdot INTC_{it} + \varepsilon_{it})$$

where $\Lambda(x) = e^x / (1 + e^x)$, α_i captures an unobserved customer specific effects, and ε_{it} is the error term. β_j can be interpreted as the change of likelihood of at least one contribution is made when each variable changes. More specifically, it describes the size of contributions of independent variables to the log of odds ratio which is defined as the ratio of the probability that an event would occur to the probability that an event would fail to occur (i.e. $\Pr(CONT_{it} = 1) / \Pr(CONT_{it} = 0)$).¹ Active Group Size ($AGRP_{it}$) is the log value of the number of active

¹ Thus, an odds ratio greater than 1 indicates that the contribution is more likely to occur.

participants in the last month. We define active participants in month t as the users who have contributed either innovation ideas or comments in this month. Tenure in the Community ($TNRE_{it}$) is the number of months since customer i has joined the online brand community. Connection to SNS ($CSNS_{it}$) is a dummy variable which indicates whether IdeaStorm is connected to the social network Facebook in the current month; it is coded as 1 when IdeaStorm is connected with Facebook in that month, and 0 otherwise. Interest Concentration ($INTC_{it}$) measures the interest concentration of customer i until last month. In order to measure the concentration of interest, we have adopted the Herfindahl-Hirschman Index (HHI) (Herfindahl 1950; Hirschman 1945). HHI is commonly used to measure the concentration in an industry. It is also used as a measure of concentration in ecology (Simpson 1949) in addition to economics. In IdeaStorm, there are three general categories for contributed ideas: “Product Ideas”, “Dell Ideas” and “Topic Ideas”. Suppose user i contributes S_{imt-1} ideas to category m until month $t-1$, the

concentration of interest is calculated by $INTC_{it} = \frac{\sum_{m=1}^3 S_{imt-1}^2}{\left(\sum_{m=1}^3 S_{imt-1}\right)^2}$. Interest concentration is assumed to be 1 when customers have no contribution until current month.

Results

Table 1 shows the descriptive statistics (including correlations) of the variables. We checked that the Variance Inflation Factors (VIF) for all independent variables are far lower than 4 while the suggested threshold is 10.

| Variable | N | Mean | Std. Dev. | Min | Max | CONT | AGRP | TNRE | CSNS |
|--------------------------------------|-------|-------|-----------|------|-------|-------|-------|-------|-------|
| Contribution (CONT) | 8,920 | 0.38 | 1.63 | 0.00 | 41.00 | | | | |
| Active User Size (AGRP) | 8,920 | 6.17 | 0.88 | 0.00 | 7.88 | -0.01 | | | |
| Tenure in Community (TNRE) | 8,920 | 10.50 | 5.77 | 1.00 | 20.00 | -0.21 | -0.16 | | |
| Connection to SNS (CSNS) | 8,920 | 0.45 | 0.50 | 0.00 | 1.00 | -0.15 | -0.16 | 0.71 | |
| Interest Concentration (INTC) | 8,920 | 0.71 | 0.23 | 0.33 | 1.00 | 0.01 | -0.06 | -0.22 | -0.10 |

| Variable | Coefficient |
|---|-------------------------|
| Active Group Size (AGRP) | -0.3121 *** (0.0269) |
| Tenure in Community (TNRE) | -0.2737 *** (0.0171) |
| Connection to SNS (CSNS) | 0.7181 *** (0.1753) |
| Interest Concentration (INTC) | 6.2323 *** (0.5124) |
| N | 8,860 |
| Pseudo R-Squared | 39.53% |
| <i>Significant at 1% ***, 5% **, and 10% *. The numbers in parentheses are bootstrap standard errors.</i> | |

Table 2 presents the results of model estimation. We have adopted the bootstrap standard errors, which provides more accurate estimation for standard error (Efron 1981). The overall pseudo R-squared is 39.53 percent. All variables included are significant at 1% level. Thus, tenure in the community, active group size, connection with

SNS, and interest concentration are important factors in the likelihood of contribution of innovation ideas by customers. Consistent with Hypothesis 1, the active group size has a negative impact on the contribution of innovation ideas ($\beta_{AGRP} = -0.31$, $p\text{-value} < 0.01$). Thus one percent increase in the active group size leads to a 0.31 percent decrease in the odds of contributing an innovation idea. The negative coefficient for tenure in community supports our Hypothesis 2 ($\beta_{TNRE} = -0.27$, $p\text{-value} < 0.01$). One unit increase in tenure in community is associated with 24 percent decrease in the odds of contributing an innovation idea. The result on the positive impact of connection to social network site is also consistent with our Hypothesis 3 ($\beta_{CSNS} = 0.72$, $p\text{-value} < 0.01$). The connection to SNS is found to increase the odds of contribution by 105 percent. Interest concentration also has a positive and significant effect on the likelihood of contributing innovation ideas ($\beta_{INTC} = 6.23$, $p\text{-value} < 0.01$). Overall, our empirical results are consistent with the hypotheses and the perception that likelihood of contribution is influenced by community factors, including size of community and connection to SNS, and individual factors including tenure in the community and interest concentration.

Discussion

Our findings extend the research on the relationship between group size and contribution by using the resource based theory. This research demonstrates that negative effects of group size on contribution level overwhelm its positive effects in their complex impact on contribution level. Members in online innovation communities are less likely to contribute their innovation ideas when the group size increases, which is different from findings in some previous studies (Andreoni 1988; Zhang et al. 2010). This difference can be attributed to different context of research. In an online brand community, the benefits from contribution can be more complex than other social structures because of the involvement of firm, brand, and customers' expectation of adoption. When group size grows, the average adoption and attention received per idea may decrease. Moreover, similar ideas are more likely to be contributed by others, thus discourages individual's contribution. Although total contribution may increase with group size, individual contribution decreases significantly when the group size is larger.

Our study highlights the important role that tenure in the community plays in brand communities for innovation. The negative effect of tenure in community outweighs its positive effect of tenure in the community whereby customers develop cognitive and social capital to participate in online innovation community. This finding is contrary to some previous study on the relationship between tenure in community and contribution (Wasko et al. 2005). When members stay longer in the community, they may experience loss of interest or customers have limited capacity to contribute innovation ideas.

In addition, our findings also make contributions to the literature on SNS and innovation communities. Connection to SNS brand communities has not been well studied in the prior literature. These empirical results suggest that online brand communities can boost the number of innovation contributions by connecting to SNS. By enlarging the audience size of the online brand community, community members in Dell IdeaStorm contributed more innovation ideas. Further, personal interest constitutes an important factor for innovation contribution in online brand communities. Individuals with different levels of interest perceive the benefits of contribution differently. The impact of interest on contribution is demonstrated by the effect of interest concentration. Customers with more concentrated interest (and stronger interest) are more likely to contribute to the brand community.

Theoretically, our research contributes to the literature in three ways. We extend the resource based theory from knowledge sharing among community members to brand communities for innovation. We identify the four antecedents of customers' contributions. Methodologically, we avoid the method biases by not using survey instruments and adopting a longitudinal (panel) data analysis.

An important finding with practical implications is that customer's contributions of innovation ideas decrease significantly with tenure in community. This finding suggests that in order to attract more innovation ideas and make it a sustainable community, companies need to keep promoting the brand community and attract more new online members. In addition, contrary to research in other contexts (Andreoni 1988; Zhang et al. 2010), group size has a negative effect on the contribution of innovation ideas in the innovation community. This shows that having a large number of customers in the brand community might not always lead to a positive effect in terms of likelihood of innovation idea contribution. For example, customers who contribute innovation ideas might be less enthusiastic in contribution if many people engage in the discussion. Together with the finding on tenure in the community, while online innovation community has to keep attracting new customers, a company may have to maintain an

appropriate size of community that can provide customers with sufficient resources.² With reference to our finding on the positive effect of connection to SNS, it is recommended that managers of online brand communities connect the brand community to other social media in order to reach a larger audience in the social network site and increase the participation of brand community members.

Limitations

One limitation of our study comes from the fact that the data we collected is restricted to Dell IdeaStorm. Since Dell is a personal computer company based in the U.S., additional work in other innovation communities will be needed to evaluate whether our model factors have similar impact in different contexts. The second limitation is regarding the measure of interest concentration. In our empirical analysis, we have used a proxy for interest concentration, i.e. the category chosen by the author for each idea, to evaluate the interest concentration. Other measures of personal interest can be used if more information is available. The third limitation is the effect of unobserved factors although we considered unobservable heterogeneity across customers through fixed effects model. The sales volume of Dell products, competition from other brands as well as the macroeconomic situation may have an impact on the number of contributions. Future work might benefit from consideration of these factors. Fourth, besides the likelihood of contribution of innovation ideas, the value of each idea is also an important consideration for firms. Further research can be fruitfully directed on the factors that impact the value of contribution of innovation ideas (Di Gangi et al. 2009). Lastly, our empirical model used the four variables we have derived from resource-based theory. There might be more factors which impact the innovation contribution from customers: monetary rewards (von Hippel et al. 2003) and adoption of customer's ideas (Durcikova et al. 2009). Due to the limitation of our data, these variables are not included in the analysis.

Conclusion and Future Plans

This study develops and does a preliminary test of a theoretical model that explains what factors drive customers to contribute innovation ideas to online innovation community. It contributes to fill the gap of the literature in understanding contribution to online brand community for innovation purposes. A resource-based theory of social structure is used to develop the research model. Besides contributing to theory building of online brand community, the results of this research offer practical implications to the companies who are interested in exploring the value of brand community. In future, we plan to extend this research by identifying more variables in the framework and analyze the business value of innovation ideas contributed by customers.

References

- Ainley, M.D. "Interest in Learning and the Disposition of Curiosity in Secondary Students: Investigating Process and Content," in: *Interest and learning* IPN, Kiel, Germany, 1998, pp. 257–266.
- Andreoni, J. "Privately Provided Public Goods in a Large Economy: the Limits of Altruism," *Journal of Public Economics* (35:1), Feb 1988, pp 57-73.
- Andreoni, J. "Giving Gifts to Groups: How Altruism Depends on the Number of Recipients," *Journal of Public Economics* (91:9), Sept 2007, pp 1731-1749.
- Bilodeau, M., and Slivinski, A. "Toilet Cleaning and Department Chairing: Volunteering a Public Service," *Journal of Public Economics* (59:2), Feb 1996, pp 299-308.
- Bock, G.-W., Zmud, R.W., Kim, Y.-G., and Lee, J.-N. "Behavioral Intention in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces and Organizational Climate," *MIS Quarterly* (29:Special Issue) 2005, pp 87-111.
- Boyd, D., and Ellison, N.B. "Social Network Sites: Definition, History and Scholarship," *Journal of Computer-Mediated Communication* (13:1), Oct 2007, pp 210-230.
- Brown, S., Kozinets, R.V., and Sherry, J.F. "Teaching Old Brand New Tricks: Retro Branding and the Revival of Brand Meaning," *Journal of Marketing* (67:3), July 2003, pp 19-33.

² This does not imply the total number of contributions in a community decreases with group size since the active group number may attract more new customers. This issue will be further studied in our future work.

- Butler, B.S. "Membership Size, Communication Activity, and Sustainability: a Resource-based Model of Online Social Structures," *Information Systems Research* (12:4), Dec 2001, pp 346-362.
- Chintagunta, P.K., Jain, D.C., and Vilcassim, N.J. "Investigating Heterogeneity in Brand Preference in Logit Model for Panel Data," *Journal of Marketing Research* (28:4), Nov 1991, pp 417-428.
- Chiu, C.-M., Hsu, M.-H., and Wang, E.T.G. "Understanding Knowledge Sharing in Virtual Communities: An Integration of Social Capital and Social Cognitive Theories," *Decision Support Systems* (42:3), Dec 2006, pp 1872-1888.
- Chua, Z., Goh, K.-Y., Kankanhalli, A., and Phang, C.-W. "Investigating Participation in Online Policy Discussion Forums Over Time: Does Network Structure Matter?," Proceedings of the International Conference on Information Systems, 2007, p. 117.
- Di Gangi, P.M., and Wasko, M. "Steal My Idea! Organizational Adoption of User Innovations from a User Innovation Community: A Case Study of Dell IdeaStorm," *Decision Support Systems* (48:1), Dec 2009, pp 303-312.
- Durcikova, A., and Gray, P. "How Knowledge Validation Processes Affect Knowledge Contribution," *Journal of Management Information Systems* (25:4), Spring 2009, pp 81-107.
- Efron, B. "Nonparametric Estimates of Standard Error: the Jackknife, the Bootstrap and Other Methods," *Biometrika* (68:3) 1981, pp 589-599.
- Ellison, N.B., Steinfield, C., and Lampe, C. "The Benefits of Facebook "Friends": Social Capital and College Students' Use of Online Social Network Sites," *Journal of Computer-mediated Communication* (12:4), July 2007, pp 1143-1168.
- Fang, Y., and Neufeld, D. "Understanding Sustained Participation in Open Source Software Project," *Journal of Management Information Systems* (25:4), Spring 2009, pp 9-50.
- Feld, S. "Social Structural Determinants of Similarity Among Associates," *American Sociology Review* (47:6), Dec 1982, pp 797-801.
- Fournier, S., and Lee, L. "Getting Brand Communities Right," *Harvard Business Review* (87:4), April 2009, pp 105-111.
- Fulk, J., Flanagan, A.J., Kalman, M.E., Monge, P.R., and Ryan, T. "Connective and Communal Public Goods in Interactive Communication Systems," *Communication Theory* (6:1) 1996, pp 60-87.
- Füller, J., Jawecki, G., and Mühlbacher, H. "Innovation Creation by Online Basketball Communities," *Journal of Business Research* (60:1), January 2007, pp 60-71.
- Füller, J., Matzler, K., and Hoppe, M. "Brand Community Members as Source of Innovation," *Journal of Product Innovation Management* (25:6), Nov 2008, pp 608-619.
- Greene, W.H. *Econometric Analysis*, (6th Edition ed.) Prentice Hall, Upper Saddle River, New Jersey, 2007.
- Gu, B., Prabhudev, K., Rajagopalan, B., and Chen, H.-W.M. "Competition Among Virtual Communities and User Valuation: the Case of Investing-related Communities," *Information System Research* (18:1), March 2007, pp 68-85.
- Herfindahl, O.C. *Concentration in the Steel Industry* unpublished Ph.D dissertation, Columbia University, 1950.
- Hirschman, A.O. *National Power and the Structure of Foreign Trade* University of California Press, Berkeley and Los Angeles, 1945.
- Issac, R.M., and Walker, J.M. "Group Size Effects in Public Goods Provision: the Voluntary Contribution Mechanism," *The Quarterly Journal of Economics* (103:1), Feb 1988, pp 179-199.
- Jackson, D. *Jackson Personality Inventory-Revised Manual* Sigma Assessment Systems, Port Huron, MI, 1994.
- Kankanhalli, A., Tan, B.C.Y., and Wei, K.-K. "Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation," *MIS Quarterly* (29:1) 2005, pp 113-143.
- Keller, K.L. *Strategic Brand Management: Building, Measuring, and Managing Brand Equity* Prentice Hall, Upper Saddle River, NJ, 2003.
- Langevin, R.L. "Is Curiosity a Unitary Construct?," *Canadian Journal of Psychology* (25:4), Aug 1971, pp 360-374.
- Lilien, G.L., Morrison, P.D., Searls, K., Sonnack, M., and von Hippel, E. "Performance Assessment of the Lead User Idea-Generation Process for New Product Development," *Management Science* (48:8), Aug 2002, pp 1042-1059.
- Loewenstein, G. "The Psychology of Curiosity: A Review and Reinterpretation," *Psychological Bulletin* (116:1), July 1994, pp 75-98.
- McAlexander, J.H., Schouten, J.W., and Koenig, H.F. "Building Brand Community," *Journal of Marketing* (66:1), Jan 2002, pp 38-54.
- McKenna, K.Y.A., Green, A.S., and Glenson, M.E.J. "Relationship Formation on the Internet: What is the Big Attraction," *Journal of Social Issues* (58:1), Spring 2002, pp 9-31.

- Moreland, R.L., and Levine, J.M. "Socialization in Small Groups: Temporal Changes in Individual-Group Interactions," in: *Advances in Experimental Social Psychology*, Academic Press, 1982, pp. 137-192.
- Muniz, A.M., and O'Guinn, T.C. "Brand Community," *Journal of Consumer Research* (27:4) 2001, pp 412-432.
- Muniz, A.M., and Schau, H.J. "Religiosity in the Abandoned Apple Newton Brand Community," *Journal of Consumer Research* (31:4), Mar 2005, pp 737-747.
- Nambisan, S., and Nambisan, P. "How to Profit from a Better "Virtual Customer Environment"," *MIT Sloan Management Review* (49:3), April 2008, pp 52-63.
- Olson, M. *Logic of Collective Action: Public Goods and the Theory of Groups* Harvard University Press, Cambridge, MA, 1965.
- Rice, R.E. "Communication Networking in Computer-conferencing Systems: A Longitudinal Study of Group Roles and System Structure," in: *Communication Yearbook*, M. Burgoon (ed.), Sage, Beverly Hills, CA., 1982, pp. 925-944.
- Silvia, P.J. *Exploring the Psychology of Interest* Oxford University Press, New York, 2006.
- Simpson, E.H. "Measurement of Diversity," *Nature* (163), Apr 1949.
- Subramani, M.R. "How Do Suppliers Benefit from Information Technology Use in Supply Chain Relationships?," *MIS Quarterly* (28:1) 2004, pp 45-73.
- Thorn, B.K., and Connolly, T. "Discretionary Data Bases," *Communication Research* (14:5) 1987, pp 512-528.
- von Hippel, E. *The Source of Innovation* Oxford University Press, New York, Oxford, 1988.
- von Hippel, E., and von Krogh, G. "Open Source Software and the "Private-Collective" Innovation Model: Issues for Organizational Science," *Organization Science* (13:2), Mar 2003, pp 209-223.
- von Hippel, E., and Katz, R. "Shifting Innovation to Users via Toolkits," *Management Science* (48:7), July 2002, pp 821-833.
- Wasko, M.M., and Faraj, S. "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice," *MIS Quarterly* (29:1), Mar 2005, pp 35-57.
- Zhang, X.M., and Feng, Z. "Group Size and Incentives to Contribute: a Natural Experiment at Chinese Wikipedia," in: *NET Institute Working Paper*, NET Institute, 2010.