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# PARTICIPANT NETWORK PATTERNS IN ENHANCING ONLINE COMMUNITY INTERACTIVITY

*Research in Progress*

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## Abstract

*Social media is having an increasing impact on businesses. In particular, the explosive growth of online brand communities has attracted organizations and marketers' attentions. However, despite the increasing importance of online community for marketing, it is noticed that relatively few of them are successful in attracting community members and enhancing interactivity. In this study, we argue that it is necessary to have a comprehensive understanding regarding how the community members participate in the communal context and interact with each other, and thereby the community interactivity can be continued. To this end, we collected a large amount of data from an online discussion forum where we found that the participants were highly interactive across the discussion topics, thus forming robust communities. Currently, the data analysis pertaining to this study is work in progress, but we will be in a position to offer more in-depth analysis of the rich findings that the research has generated by the time of the conference.*

*Keywords: Social media, online community, online participation, social network, network pattern, big data*

## **1 Introduction**

Social media has transformed the ways of organizations doing business and interacting with their customers. Research states that the fast growth of social media provides good opportunities for organizations to establish themselves and their product brands with low start-up costs (e.g. Haavisto, 2014), improve customer relationships (e.g. Fuller & Matzler, 2008) and extend the reach of markets to areas that were previously inaccessible (e.g. Mangold & Faulds, 2009). The popularity of social media in the business context demonstrates that organizations view it as having great business potential that can be leveraged to provide multiple accesses to customers. Furthermore, researchers point out that web users sharing their comments in relation to their shopping and use experiences through social media has a strong influence on other consumers' purchasing decisions (Miller, Fabian, & Lin, 2009). As a consequence, practitioners and organizations are increasingly engaging in online conversations and activities so as to influence customers' buying choices (Miller et al., 2009).

Although it is believed that the pervasive use of social media offers the opportunities for organizations and marketers actively involving in customer online activities, some research have indicated that companies do not always gain the benefits from their engagement. In fact, consumers are not necessarily as active online as it has been believed (Preece, Nonnecke, & Andrews, 2004), and it is found that many online communities created for having communication with customers have turned into "cyber ghost towns" (Phang, Kankanhalli, & Sabherwal, 2009), being unable to communicate and interact with the customers. As a result, online communities are not necessarily as powerful as expected and desired by researchers and practitioners. We argue that marketers, before getting a jump on developing online brand community, should have a better understanding of customer activities and interactives in the online communal context, especially those created and managed by the customers themselves. To this end, this research is set out to answer this question: how do the participants interact with each other to sustain an online community?

In this research, we conduct social network analysis so as to have an understanding of the network patterns constructed by the participants. By looking into the interactions among the participants, online community sustainability can be better understood. We place a special interest in the automobile industry and collect data from a popular web discussion forum MyCar (a pseudonym), from which we collect substantial data. The vehicle model Nissan Cefiro was chosen as the case study for it having the most popular discussion topics in the forum. The car-related posts, dated from October 2004 to May 2016, containing 1,270 participants and 11,245 posts constitutes our dataset. The preliminary findings reveal that in online communities with a cross-topic conversation space, an individual can participate in a central role in some circumstances, but in a peripheral way in others. Moreover, by comparing different levels of user participants, it is found that the high-usage and low-usage members influence the interactivities of a community in different ways. This study continues to analyze the data. With the decent progress of data analysis, we will be able to complete the work before the conference and thereby to share further discoveries in this event.

## **2 Conceptual background**

Social media is transforming the way people communicate and interact, as well as having an increasing impact on businesses. The explosive development of social media is empowering consumers, and their role is shifting from being passive recipients of information to becoming active generators of information (Goh, Heng, & Lin, 2013). As consumers are increasingly performing activities previously controlled by companies, the entire marketing landscape is changing. Therefore, companies need to better understand the changing behaviour of consumers, especially those who participated in online activities, in order to create mutual benefits from the use of social media.

Despite more and more organizations having invested in business activities in the social media realm, it has emerged that businesses do not always gain the benefit from their engagement. Hilderbrand et al.'s study (2013), based in a European automobile manufacturer, reports that a user-generated product co-created by the company and the customers online, although allowing for user opinions involved in the process of product design, did not satisfy other customers' needs and as a result led to a negative influence on consumer satisfaction and product reliability. Another example is that regarding the case of McDonald asking its customers to share their positive experiences about the company on Twitter (Pfeffer, Zorbach, & Carley, 2014). It however had to withdraw this promotion within only two hours as it had been exposed to a massive amount of negative comments and resulted in an appalling impact on the company's reputation.

To better understand customer behaviour on line, we take a special focus on the roles and contextual development of participation (i.e. who are the participants and what they do) in online communities. The relevant work on knowledge gaining and learning processes in communities of practice, produced by Lave and Wenger (1991), identifies a spectrum of community behaviour ranging from "newcomers" to "full participation". Following on from this, there have been many attempts to develop typologies of participant roles and to study particular categories of participation behaviour (Graham & Wright, 2014). For example, Kim (2000) differentiates among several participation roles: the visitor, novices, regulars, the leaders and elders. After distinguishing active/inactive participation, Graham and Wright (2014) go further in identifying what they term different super-participant roles in online discussion forums, the three types being: super-posters, agenda-setters and facilitators. Furthermore, a dynamic change in participant roles has been noted. Specifically, Preece and Schneiderman (2009) propose a reader to leader framework, which places emphasis on the different needs and values at different levels of participation. Li and Bernoff (2008) develop a ladder-type graph known as "social technographics profiling", which uses the findings from large-scale surveys to create profiles of online behaviour. In recent studies, Faraj et al. (2011; 2013) use the term "generative role-taking" and define the participant roles as community sustaining ones, which are aimed at maintaining a productive dialogue among the participants. Based on the theory of online participation, this study investigates how the different levels of participation influencing the interactivities of online communities.

### 3 Data collection and analysis

We collected data from an online discussion forum MyCar which has attracted many automobile amateurs and experts, with some of them repetitively and continuously posting and sharing their experiences and know-how on the site. For this research, an online brand community about the vehicle model Nissan Cefiro emerged in this forum is selected as the studied case for it being the most long-lasting discussions. Table 1 provides descriptive information for the four discussion boards.

Discussion topics	Discussion board created time & person	Number of participants	Number of posts	Level of interactivity
Cefiro's owners, please come to sign here (Abbreviation: Sign-here)	February 2007, By Sport	909	7,701	Medium
[LIFE TOGETHER] The automobile republic of Nissan Cefiro A32 A33 2000MAXIMA (Abbreviation: Life)	May 2012, By Su	66	456	High
Cefiro, an energy efficient vehicle, a workhorse, its DIY, car maintenance cost, fight against Economic distress The car owners of A-Fat ~~ Come sit here. (Abbreviation: DIY)	November 2013, By Yes	173	2,190	High
Nissan is here to greet all the car owners (Abbreviation: Greeting)	September 2013, By Sunny	251	898	Low

Table 1. Description of the Dataset

The discussion boards of Sign-here, DIY and Life were created by different car owners and the Greeting was done by the car company. For confidentiality reasons, the names of the participants presented in this report are pseudonyms and some of the information has been changed, but these changes do not affect our results. The level of interactivity is measured by using the social network indicators including number of nodes (i.e. the participants), isolates, ties and density, reciprocity and transitivity respectively.

The data emerged to show that, Sign-here basically functions as for welcoming newcomers and in turn newcomers would respond to those who welcomed them so that these global-level measures of network features indicated such interconnections among members. In addition, Life and DIY are where the members hang out with social activities and share technological information about their cars with others. Hence, members on these two boards intensively interacted among themselves. Social network structure of Greeting, compared to the other three ones, tells a different story: members on here occasionally had ties to one another and few members responded to those who sent “greeting” to them. One of explanations is that this board was managed by the car company and functioned as a marketer-owned customer service. Thus, the members participated in this board aim to ask specific questions about their cars, rather than having chit-chats.

Moreover, we profiled the composition of members on each board (Table 2). The member status from being the most active to the passive are: senior, high-level, advanced, normal, newcomers, unproved and guest. It shows that the participants joining in boards Sign-here, DIY, and Greeting were newcomers and normal members basically, saying these boards provide an open space for gathering a bunch of car owners and potential buyers to exchange knowledge and information about car performance and maintenance. On the other hand, Life was obviously set for those who had been in this group for a while and senior members occupied nearly 35% of total participants. Few of them were newcomers or guests. In here, members shared life experience with each other and hanged out for various social activities with regard to affective purpose so that the rate of interactions was high, compared to those interactions on DIY board for instrumental purpose even though the interaction rate was also high.

	Sign-here	Life	DIY	Greeting
Senior	13.861 (126)	34.848 (23)	23.121 (40)	13.147 (33)
High-Level	8.691 (79)	16.667 (11)	12.717 (22)	6.375 (16)
Advanced	15.072 (137)	15.152 (10)	11.561 (20)	15.538 (39)
Normal	27.172 (247)	16.667 (11)	25.434 (44)	35.458 (89)
Newcomer	31.133 (283)	12.121 (8)	25.434 (44)	28.287 (71)
Unproved	1.980 (18)	0 (0)	1.156 (2)	.398 (1)
Guest	2.090 (19)	4.545 (3)	.578 (1)	.797 (1)
Total	100 (909)	100 (66)	100 (173)	100 (251)

Percentage with number of nodes in parentheses were presented in each cell

Table 2. Composition of Membership Status by Discussion Board

With intuitive sense, members who were in close relationship had high emotional intensity, close intimacy, reciprocal services and highly time spent on each other. That is, in such affective relationship,

members had close interactions and emotional support with others. This type of relationship contributes to social solidarity and group attachment and forms the power of social influence. On the other hand, on DIY, studies have emphasized the ways in which individuals can motivate network resources to achieve specific goals. In the process of interaction, personal contacts are more instrumental purpose – providing informational resources rather than support and exchange of confidences. Hence, we can see Life and DIY provided distinguished functions to their members. The interactivity of the four discussion boards is illustrated in Table 3.

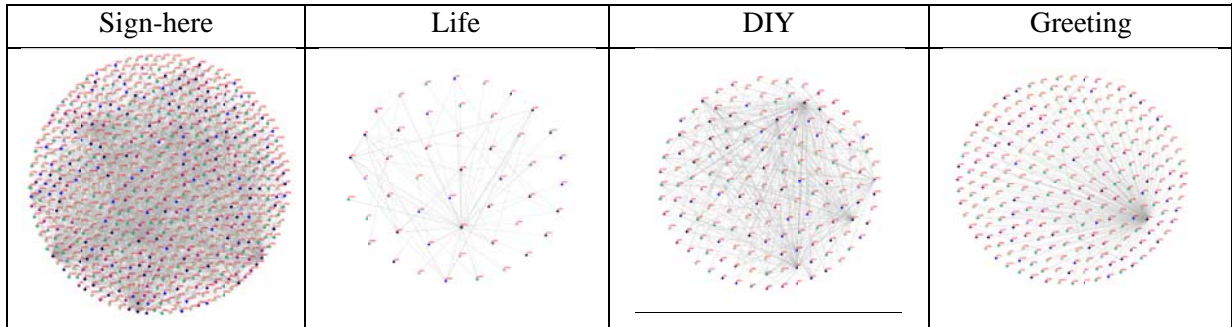


Table 3. Different levels of interactivities by the discussion boards and member status

The statistical operation and analysis are programmed and processed under the R environment with igraph package for social network analysis (R version 3.2.1) (R Core Team 2015). We further examined the performances of each category of membership on discussion boards. After examining the mean differences between membership statuses by ANOVA, we found senior members were the most active members participating in online social activities. For example, their average indegree, outdegree, outdegree reachability, outdegree geodesic distance, and betweenness were significantly higher than other categories. Senior members were the key nodes to maintain these chatting boards and junior and newcomers heavily relied on their network position to link up their personal network and the online social network as a whole.

This research also tends to identify the roles and functions of egos who were able to penetrate the network boundary and actively participate in various social activities on boards. We analyzed whether these “cross-boarders” have acted consistently across boards (see Table 3.).

	Sign-here	Life	DIY	Greeting
Sign-here	797			
Life	15	33		
DIY	81	4	74	
Greeting	3	1	1	246

Cross three boards: n = 13

Table 3. Numbers of nodes cross discussion boards (network boundary)

We first detected who had ever presented on one or more than one board in our data. We found that 13 members crossed three boards (Sign-here, Life and DIY), and 105 members crossed two boards among them 81 members crossed Sign-here and DIY boards. It implies that cross-boarders were rare to this online social group. Below, we specifically focus on these 81 members who crossed Sign-here and DIY boards and their network characteristics through quantitative analysis. For other cross-boarders (the case numbers are less than the minimum requirement of quantitative research), we will continue to conduct qualitative analysis for further discussion.

In Table 4, we found those 81 members who crossed Sign-here and DIY had higher indegree, more number of reachable members, and higher value of betweenness on Sign-here (board. That is, those cross-boarders received higher attention from others' response and were significant mediators to pass information or maintain discussion alive between members. On the other hand, on DIY board, those cross-boarders could reach more group members and were able to be more center of discussion since their closeness based upon indegree and outdegree were significantly higher than that on Sign-here board. However, we are aware that the fundamental function difference between these two boards: Sign-here board is mainly for welcoming newcomers while DIY board for driving experience and car maintenance so that on latter board discussion among members would be more enthusiastic and need- resulting in those cross-boarders sitting in the center of network.

	Sign-here	DIY	t-value
Indegree	6.320	3.345	2.290 *
Outdegree	7.259	3.679	1.770
Reachability.Indegree	.302	.450	-5.716***
Reachability.Outdegree	.363	.494	-3.816***
Geodestic Distance with reachable nodes.Indegree	274.814	76.938	14.153***
Avg. Geodestic Distance with reachable nodes.Indegree	3.243	2.838	1.746†
Geodestic Distance with reachable nodes.Outdegree	330.098	84.567	10.594***
Avg. Geodestic Distance with reachable nodes.Outdegree	2.630	2.317	1.544
Closeness.Indegree	1.781e-06	6.661e-05	-34.253***
Closeness.Outdegree	2.156e-06	9.479e-05	-18.780***
Betweenness	1781.498	200.6128	2.584 *
N	81		

†:  $p < .10$ ; \*:  $p < .05$ ; \*\*:  $p < .01$ ; \*\*\*:  $p < .001$

Table 4. T-test of node-level network features for cross-boarders

## 4 Discussion and conclusion

The preliminary findings reveal that in online communities with an open conversation space, an individual can participate in a peripheral role in some circumstances, but in a core one in others. We found that online community interactivity is not only in relation to those who are actively involved in discussion, for it is also generated by those who take a peripheral role. Currently, the data analysis pertaining to this study is work in progress. For further study, we have been now (1) investigating the “cross-border” participants. Although the number of them is rather small, we have found that they can have significant contributions to this community in sustaining community activities. Moreover, we have been conducting (1) exploratory study by using qualitative approach for a better understanding regarding the roles of the cross-borders in sustaining the community. We are confident that by the time of the conference we will be in a position to offer more in-depth analysis of the rich findings that the research has generated.

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