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Empirical study on Consumer Innovation by using Social Media in Japan

Abstract

Consumer innovation occurs when consumers improve existing products and develop new products by themselves. Consumers innovate products in Japan, although the incidence is lower than that of Western countries. On the other hand, social media spreads all over the world. Some previous studies indicate that network communities of social media are useful for consumer innovation. However, these empirical studies have not been researched yet in Japan. This paper reports the results of a survey of into consumer engagement with product innovation by analyzing the questionnaire survey data, how to promote consumer innovation in Japan is clarified. Especially, the role of social media and its community and motivations of a lead user who is a consumer innovator are elucidated. We clarify the lead user plays a central role in the network community and wants monetary incentive. From these findings, we demonstrate how to combine consumer innovation with Japanese firms.

Keywords: Consumer Innovation, Social Media, Network Community, Lead User, Motivation, Monetary incentives

Hiroki Idota

1.0 Introduction

Innovation is indispensable for the growth of a firm. Firms can gain competitive advantage by creating a variety of knowledge and developing excellent new products by themselves. However, the speed of technological progress has become faster. And the wider and deeper knowledge is needed to develop new products. In so doing, it has become more difficult to develop products in-house. Firms have shifted from so-called closed innovation processes towards a more open way of innovating. Open Innovation is the use of purposive inflows and outflows of knowledge to accelerate innovation, and expand the markets for external use of innovation (Chesbrough, 2003, 2006a, 2006b). Open innovation requires establishing networks and collaborating between firms and between firms and customers. In open innovation, the most important source of acquiring external knowledge is a user (Cohen et al., 2002).

Until now, users have been regarded as just using products that manufacturing company supplies. However, some users develop new products themselves or improve existing products. These products are suitable for user needs and ideas, but they may have to be refined to sell as merchandise. Therefore, a firm needs to commercialize them with users. These users include not just firms but consumers (Franke and Shah, 2003; Lüthje, 2004; Lüthje et al., 2005; Hyysalo, 2009 ; von Hippel et al., 2011). Especially, in the case of final consumer goods, general

consumers sometimes have ideas and take charge of product development. Products development in collaboration with customers will become more important in the future. However, previous research on consumer innovation in Japan has not been done compared with USA and UK (von Hippel et al., 2011). This paper focuses on consumers in Japan.

Social media is useful for collecting user need and idea, and seeking collaborators of product development and consumer innovators. Therefore, social media is important for product innovation (Dodgson et al., 2006; Idota, et al., 2015a, 2015b) and user (consumer) innovation (Dong & Wub, 2015; Oginka & Dong, 2017; Pacauskas et al., 2018). In order to activate consumer innovation in Japan, social media should be further utilized. In this paper we study how to use social media to develop consumer innovation in Japan.

1.1 User innovation

Regarding user innovation, von Hippel (1976) find users discover many important functions, users make prototype by themselves and test them.

von Hippel (1994) cites information stickiness as a reason for user innovation. Innovation requires both information on problems and skills to solve them. Even if the manufacturing firms do marketing research, they cannot grasp all user needs. Only users have user needs. Because of this information asymmetry, users with highly sticky information should conduct innovation in order to optimize research costs and solve problems. Information stickiness may be defined as the incremental expenditure required to transfer that unit of information to a specified locus in a form usable by a given information seeker (von Hippel, 1994). When this cost is low, information stickiness is low; when it is high, stickiness is high. The cost of transferring the information necessary to bring about innovation has a tremendous influence on where innovation is caused. If the expenses are high, no information is transferred. In other words, when highly sticky information necessary for innovation is in the hands of a user with sufficient problem solving skills, information transfer is not carried out and users often innovate.

In this case, it is more cost effective for users to create technology and ideas themselves (von Hippel, 1994).

von Hippel (1986) also mentions that the lead user is central to user innovation. A lead user is an advanced user who leads the majority users about market trends. The

lead use will be motivate through vision, creativity and curiosity to fulfill a perceived need. In addition, von Hippel (2005) demonstrates that innovation which originated from lead user spreads in an innovation community. Users combine their activities and collaborate to develop products, test them and sell them through the innovation community.

Monetary incentive often do not exist or play no major role for motivation in the innovation community (Lakhani & von Hippel, 2003; Raasch and von Hippel, 2013). Major motives found in the innovation community refer to individual factors such as enjoyment and learning and social factors such as reputation, status and forms of reciprocity (Lakhani & von Hippel, 2003; Raasch and von Hippel, 2013).

The innovation communities may be physically or virtually located. The degree of user contribution rises with advances in information technology; information technology is accelerating the increase of users who are engaged in innovation (von Hippel, 2005).

1.2 Social media

Kaplan and Haenlein (2010) define social media as “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of user-generated content.” This concept of Web 2.0 is advocated by O'Reilly (2007). The web enables everyone to become both an originator and recipient of information. The Web has become a more dynamic and interactive means of communication. Thus, social media is a series of service for general users to express and share their individual interests, concerns, feelings, experiences, and knowledge.

The diffusion of social media has had a strong influence on the business activities of firms. Previous studies show that while social media brings business opportunities to firms, it may also turn out to be a threat for them, due to the inability of firms to control social media directly. Regarding the former, Rodriguez et al. (2012) suggest that social media use has positive influences on both the sales process and its results. That is, the use of social media provides good opportunities to promote sales, since it is beneficial for firms in learning from consumers as well as establishing a new market segment and long-run positioning. It is also useful for constructing mutual trust with consumers and raising economic value for consumers (Noone et al., 2011; Kate & Pavan, 2012). Information that consumers exchange through social media

contains useful content for product improvement and new marketing strategies (Haavisto, 2014). In other words, social media brings opportunities related to CRM (Customer Relationship Management) (Malthouse et al., 2013). The so-called word-of-mouth communication in social media becomes an effective means to obtain potential customers, sales improvement, and improvements in brand image (Luo & Zhang, 2013; Hausmann, 2012). Regarding the latter, negative aspects, however, consumers hesitate to buy products referred to them by social media because of experiences of reading adverse reputations posted in social media, which causes LTV (Life Time Value) to become lower (Malthouse et al., 2013). Thus, social media are double-edged swords, but firms tend to endeavour to use social media positively to enhance their businesses.

Firms are required to mobilize all managerial resources and networks to correspond to changes in consumer needs and the market and to achieve innovation. Social media greatly improves the ability to obtain and share information; it enables the identification of new findings from big data on a real time basis and facilitates the sharing of information among various related entities. These ICT (Information and Communication Technology) features lead to innovation, and have become one of the essential bases for promoting innovation (Dodgson et al., 2006; Lee & Xia, 2006; Idota, et al., 2015a, 2015b).

1.3 User innovation by using social media

Customers are actively participating in firm-sponsored innovation activity by posting and commenting on new ideas for improving the firms' products and services, or to develop new ones (Oginka & Dong, 2017). Social media is useful of such the activity community. Social media is also useful for searching for lead users and other online users in an innovation communities (Brem & Bilgram, 2015; Dong & Wu, 2015; Oginka & Dong, 2017; Pacauskas et al., 2018).

Nowadays, advanced firms have started strategically using the online user innovation communities for open innovation initiatives (Dong & Wu, 2015).

Pacauskas et al. (2018) investigated a hamburger chain of Finland which conducted burger design contest by using social media. Their results show an important benefit from user innovation activities stems for customer learning. For example, a product design contest can provide a means to communicate a firm's offerings to its customers and increase the consumers' awareness of different options and their attribute.

Dong & Wu (2015) examine the impacts of online user innovation communities by using social media, using a large-scale panel data set from Dell and Starbucks. As the results, they find evidence that online user innovation communities enable implementation capability which increases firm value. Moreover, Oginka & Dong (2017) suggested from analysis of Starbucks' data that user interactions and other users' feedback may stimulate a focal user's contribution to such communities..

In this way, social media is useful for user innovation. However, these previous researches have extended interpretation of user innovation (Brem & Bilgram, 2015; Dong & Wu, 2015; Oginka & Dong, 2017; Pacauskas et al., 2018). For example, online user innovation communities can be used to collect ideas and comments from users and they can support to select ideas and to evaluate prototypes based on users' votes (Dong & Wu, 2015; Pacauskas et al., 2018).

There are three ways firms and consumers relate to new product development. Firstly, consumers provide information to a firm. A firm gathers and analyzes user needs and ideas. This approach involves passive user involvement. Secondly, a firm collaborates with customers to make new products Here the user is actively involved, testing prototypes and participating in various ways in product design. Thirdly, users or consumers improve and make products by themselves, that is, user innovation is conducted independently of the firm. Some products created by user innovators may subsequently be commercialized by a firm. Previous researches consider only the first and second approaches as user innovation (Brem & Bilgram, 2015; Dong & Wu, 2015; Oginka & Dong, 2017; Pacauskas et al., 2018). This paper focuses on the third approach to consumer innovation.

1.4 Proposes of this study

von Hippel, Ogawa and De Jong (2011) conducted a large international comparison study of user innovation in the United States, the UK and Japan. They found that percentage of consumer-innovators in the population aged 18 and over in the UK is 6.1% (n =1,173); 2.1% of the sample were creating consumer products and 4.5% were modifying consumer products. The consumer innovation rate in the USA is 5.2% (n=1,992); 2.9% created consumer products and 2.8% modified consumer products. Japanese rates were 3.7% (n=2,000), 1.7% and 2.5% respectively. Hence Japan has lower consumer innovators' rate than Western countries.

Products improved or created by lead users in the process of consumer innovation are likely to meet the needs of other users. Therefore, user innovation is a key innovation type. How can we increase the user innovation rate in Japan like the USA and the UK?

One important key is the utilization of social media. Social media is also popular in Japan. According to Ministry of Internal Affairs and Communications in Japan (2016), 71.2% of people use SNS (Social Networking Service) in Japan. Previous studies show social media, especially user network communities, are useful for user innovation (Brem & Bilgram, 2015; Dong & Wu, 2015; Oginka & Dong, 2017; Pacauskas et al., 2018). However, such empirical research has not been conducted in Japan. There are also few empirical studies on how consumer innovation can be implemented (e.g. von Hippel, 2011).

Therefore, the purposes of this research are to clarify whether social media and network community are useful for consumer innovation in Japan and to clarify what kind of motivations are required for consumer innovation in Japan. From these findings, practical applications concerning how to combine consumer innovation with Japanese firms for diffusing consumer innovation are discussed.

To examine the above problems, this paper decomposes them into the following hypotheses:

H1: Social media use is effective for consumer innovation (Brem & Bilgram, 2015; Dong & Wu, 2015; Oginka & Dong, 2017; Pacauskas et al., 2018);

H2: Affiliation to network community is effective for consumer innovation (Brem & Bilgram, 2015; Dong & Wu, 2015; Oginka & Dong, 2017; Pacauskas et al., 2018);

H3: Lead users conduct consumer innovation (von Hippel, 1986; 2005, Lüthje & Herstatt, 2004);

H4: Motivators such as innovator or early adopter, cutting-edge member are important for consumer innovation (Franke & Shah, 2003; Ståhlbröst & Bergvall-Kåreborn, 2011); and

H5: Monetary incentive is not important for consumer innovation (Raasch and von Hippel, 2013).

2.0 Methodology

2.1 Questionnaire

We conducted the web survey on social media usage and consumer innovation experience in December 2017. We requested Rakuten Research Inc. to conduct this survey and it asked 3,000 people in Japan between the ages of 15 and 80 to respond the survey. These 3,000 valid responses are collected according to the gender and age composition rate of Japan.

Questionnaire items consisted of usage of social media and network communication, consumer innovation experiences and motivation, and user attributes such as gender, age, and occupation.

2.2 Measures and data

This study employs probit regression, which enables the clarification of the relationships between consumer innovation and social media usage and network community. We distinguish the two type of consumer innovation. The former is existing product improvement by consumer innovation (EPI), whereas the latter is new product development by consumer innovation (NPD). The dependent variables are presence of these experiences (0 = no; 1 = yes).

On the other hand, the following variables are used for the independent variables based on the questions: (1) Presence of social media usage (0 = no; 1 = yes) ; (2) Presence of affiliation to network community (0 = no; 1 = yes) ; (3) Role in a network community such as “Administrator,” “General member,” and so on (1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree); (4) Merit of belonging network community such as “presence of other community members’ support,” “Presence of support from community members who know experts without belonging to the community,” and so on (1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree); (5) Presence of experience of supporting other member (0 = no; 1 = yes); (6) Reasons for supporting other members such as “I often recognize and get encouragement from members of the community,” “I am happy to get evaluation and appreciation,” “My community has the norm to help each other without reward,” “I trust all members of the community,” “I am happy to give others advice as an expert, ” and so on (1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree); (7) Lead user such as “If you know a lead

user, is the person with whom you have relationships only on the Internet?,” “If you know a lead user, is the person (friends, colleagues, etc.) with whom I have relationships outside the Internet?,” and “I am a lead user” (0 = no; 1 = yes); (8) Use of results of consumer innovation such as “Results are shared in the community for free,” “Many problems are solved in the community,” “Results are adopted and commercialized by a firm,” and so on (1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree); (9) Motivation of user innovation such as “It is important for me to use new products as soon as possible,” “I am regarded as a cutting-edge member in my field (e.g. hobby, work),” “I have received benefits from others' ideas,” and so on (1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree); and (10) Monetary incentive such as “I currently get monetary rewards,” “I received monetary rewards in the past,” and “I want to get monetary rewards in the future” (0 = no; 1 = yes).

In order to eliminate multicollinearity, if the correlation coefficient between independent variables is 0.5 or more, either variable is removed.

The control variables are selected from questionnaire items which are high correlation coefficient with the dependent variables. As a result, control variables are the following variables: (1) Gender (0 = female; 1 = male); (2) Age such as “Less than 40 years old” (0 = 40 years old and more; 1 = less than 40 years old); (3) Occupation such as “University student,” “Employee,” and “Top manager” (0 = no; 1 = yes).

Table 1 shows basic statistics of the independent variables, the selected dependent variables and the control variables. EPI of consumer innovation rate is 2.20% and rate of NPD is 1.97%. These percentages are similar to von Hippel’s previous research (von Hippel et al., 2011). Social media usage rate is 70.6%. This rate is also same to Ministry of Public Management’s research (Ministry of Public Management, 2017).

Variables		Obs	Avg.	Std. Dev.	Min	Max
Consumer innovation	EPI	3,000	0.02	0.15	0	1
	NPD	3,000	0.02	0.14	0	1
Social media use		3,000	0.71	0.46	0	1
Affiliation of network community		2,120	0.28	0.45	0	1
Role of network community	Administrator	602	1.88	1.25	1	5
	General member	602	3.49	1.22	1	5
Merit of network community	Other community members' support	602	2.88	1.19	1	5
	Community members who know experts outside the community support me	602	2.63	1.14	1	5
Experience of supporting other member		602	0.57	0.50	0	1
Reasons for supporting other members	I often recognize and get encouragement from members of the community.	343	3.49	0.96	1	5
	I am happy to get evaluation and appreciation.	343	3.85	0.93	1	5
	My community has a norm to help each other without reward.	343	3.36	1.07	1	5
	I trust all members of the community	343	3.70	0.90	1	5
	I am happy to give others advice as an expert	343	3.38	1.00	1	5
Lead user	If you know a lead user, is the person with whom you have relationships only on the Internet?	210	0.57	0.50	0	1
	If you know a lead user, is the person (friends, colleagues, etc.) with whom I have relationships outside the Internet?	210	0.42	0.50	0	1
	I am a lead user.	210	0.33	0.47	0	1
Result of consumer innovation	Results are shared in the community for free.	210	3.48	0.94	1	5
	Many problems are solved in the community.	210	3.30	0.91	1	5
	Results are adopted and commercialized by a firm.	210	2.99	1.08	1	5
Motivation of consumer innovation	It is important for me to use new products as soon as possible.	424	3.19	1.14	1	5
	I am regarded as a cutting-edge member in my field (e.g. hobby, work).	424	2.76	1.11	1	5
	I have received benefits from others' ideas.	424	2.76	1.13	1	5
Monetary incentive	I currently get monetary rewards.	424	0.08	0.26	0	1
	I received monetary rewards in the past.	424	0.13	0.33	0	1
	I want to get monetary rewards in the future.	424	0.32	0.47	0	1
Gender		3,000	0.50	0.50	0	1
Age	Less than 40 years old	3,000	0.34	0.47	0	1
Occupation	University student	3,000	0.04	0.19	0	1
	Employee	3,000	0.51	0.50	0	1
	Top Manager	3,000	0.05	0.22	0	1

Table 1. Basic statistics

3.0 Findings

3.1 Estimation model 1: social media use and consumer innovation

This study employs probit analysis, which enables the clarification of the relationships between two types of consumer innovations and social media usage. Dependent variables are two types of consumer innovations, while independent variables are social media use and control variables. Table 2 shows the results of estimation. In both types of consumer innovations, social media use was significant plus ($p < 0.01$). Thus, H1 was supported.

Variables	Consumer innovation			
	EPI		NPD	
	Coff.	Std. Err.	Coff.	Std. Err.
Social media use	0.526***	0.194	0.918***	0.305
Gender	0.311***	0.118	0.231*	0.121
Less than 40 years old	0.475***	0.119	0.411***	0.125
University student	0.371	0.231	0.473**	0.228
Employee	0.232*	0.14	0.172	0.147
Top manager	0.514**	0.232	0.535**	0.239
Constant	3.062***	0.215	3.370***	0.314
Observations	3,000		3,000	
Pseudo R-squared	0.0965		0.107	
Log likelihood	-286.6		-259.2	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2. Social media use and consumer innovation

3.2 Estimation model 2: network community and consumer innovation

Here we analyse the influence of the network community on consumer innovation. First of all, dependent variables are the same as previous estimation, while independent variables are affiliation of network community and control variables. Affiliation of network community was significant plus for both consumer innovations (EPI: $p < 0.01$; NPD: $P < 0.01$) (see table 3). Therefore, H2 was supported.

Secondly we changed this independent variable to affiliation of network community to rule of network community such as “administrator” and “general member.” “Administrator” was significant plus fort both consumer innovations (EPI: $p < 0.01$; NPD: $P < 0.01$), however “general member” was significant for neither.

Thirdly, we also changed this independent variable to examine merit of belonging to a network community such as “Other community members’ support” and “Community

members who know experts without belonging to the community support me.” “Community members who know experts without belonging to the community support me” was both significant plus (EPI: $p < 0.05$; NPD: $P < 0.01$). However, “Other community members’ support” was only significant plus about EPI ($p < 0.05$).

Fourthly, we changed this independent variable to experience of supporting other member. Experience of supporting other member was both significant plus (EPI: $p < 0.01$; NPD: $P < 0.01$).

Finally, this independent variable was changed to reasons for supporting other members such as (1) “I often recognize and get encouragement from members of the community,” (2) “I am happy to get evaluation and appreciation,” (3) “My community has a norm to help each other without reward,” (4) “I trust all members of the community,” and (5) “I am happy to give others advice as an expert.” (1) “I often recognize and get encouragement from members of the community” was both significant plus (EPI: $p < 0.01$; NPD: $p < 0.05$). (5) “I am happy to give others advice as an expert” was only significant plus about EPI ($p < 0.1$). On the other hand, (4) “I trust all members of the community” was both significant minus (EPI: $p < 0.01$; NPD: $p < 0.1$).

Variables	Consumer innovation			
	EPI		NPD	
	Coff.	Std. Err.	Coff.	Std. Err.
Affiliation of network community	1.012***	0.134	0.986***	0.137
Gender	0.300**	0.132	0.319**	0.137
Less than 40 years old	0.389***	0.135	0.323**	0.138
University student	0.225	0.251	0.386	0.249
Employee	0.163	0.161	0.154	0.167
Top manager	0.376	0.276	0.535**	0.263
Constant	2.943***	0.185	2.952***	0.191
Observations	2,120		2,120	
Pseudo R-squared	0.179		0.173	
Log likelihood	-230		-219.8	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3. Network community and consumer innovation

3.3 Estimation model 3: lead user and consumer innovation

Next, we examined what types of lead users affect consumer innovation. In this case, the dependent variables are the same as previous estimation, while the independent variables are constructed by the following three types of lead users: (1) A person on

the Internet as “If you know a lead user, is the person with whom you have relationships only on the Internet?”; (2) A person outside the Internet as “If you know a lead user, is the person (friends, colleagues, etc.) with whom I have relationships outside the Internet?”; and (3) myself as “I am a lead user”. In addition to these, same control variables are included.

Regarding the results of estimation, myself as “I am a lead user” was significant plus for both consumer innovation (EPI: $p < 0.01$; NPD: $p < 0.01$) (see table 4). However, a person on the Internet and a person outside the Internet were not significant.

Since it was confirmed that a lead user is useful for two types of consumer innovations, H3 was supported.

Variables	Consumer innovation			
	EPI		NPD	
	Coff.	Std. Err.	Coff.	Std. Err.
A person on the Internet	0.294	0.238	0.339	0.24
A person outside the Internet	0.336	0.22	0.319	0.222
Myself	0.854***	0.239	0.780***	0.241
Gender	0.23	0.225	-0.047	0.226
Less than 40 years old	0.435*	0.231	0.377	0.233
University student	0.364	0.434	0.593	0.429
Employee	0.282	0.298	0.208	0.296
Top manager	0.098	0.502	0.245	0.502
Constant	2.051***	0.371	1.876***	0.35
Observations	210		210	
Pseudo R-squared	0.182		0.168	
Log likelihood	-95.25		-92.85	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4. Lead user and consumer innovation

3.4 Estimation model 4: motivation of consumer innovation

This section focused motivation of consumer innovation. In other words, the kind of motivation that promotes consumer innovation is analyzed. Again two types of consumer innovations are taken as the dependent variables, while the independent variables are as follows: (1) “It is important for me to use new products as soon as possible”; (2) “I am regarded as a cutting-edge member in my field (e.g. hobby, work)”; and (3) “I have received benefits from others' ideas” and control variables.

The results of estimation are shown in Table 5. As the results, (1) “It is important for me to use new products as soon as possible” was only significant plus of EPI ($p < 0.05$),

while, (2) “I am regarded as a cutting-edge member in my field (e.g. hobby, work)” and (3) “I have received benefits from others' ideas” were found to be only significant plus of NPD ($p < 0.05$; $p < 0.01$). H4 was partly supported.

Variables	Consumer innovation			
	EPI		NPD	
	Coff.	Std. Err.	Coff.	Std. Err.
It is important for me to use new products as soon as possible.	0.209**	0.091	0.141	0.1
I am regarded as a cutting-edge member in my field (e.g. hobby, work).	0.134	0.091	0.219**	0.098
I have received benefits from others' ideas.	0.109	0.09	0.263***	0.098
Gender	0.215	0.172	0.118	0.181
Less than 40 years old	0.352**	0.175	0.218	0.187
University student	0.148	0.339	0.301	0.346
Employee	0.161	0.206	0.054	0.221
Top manager	0.234	0.331	0.212	0.345
Constant	2.903***	0.34	3.314***	0.388
Observations	424		424	
Pseudo R-squared	0.124		0.162	
Log likelihood	-160.5		-143.3	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5. Motivation and consumer innovation

3.5 Estimation model 5: monetary incentive of consumer innovation

The fifth hypothesis tested whether monetary incentive affects consumer innovation. The dependent variables are again two types of consumer innovations, while the independent variables consists of the following: (1) “I currently get monetary rewards”; (2) “I received rewards in the past”; (3) “I want to get rewards in the future” and control variables.

As the result shown in Table 6, (1) “I currently get monetary rewards” and (2) “I received rewards in the past” were significant pluses for both consumer innovation types (EPI: $p < 0.01$; NPD: $p < 0.01$). However, (3) “I want to get rewards in the future” was only a significant plus for NPD ($p < 0.05$). Monetary incentive affect consumer innovation is founded. Therefore, H5 was denied.

Finally, we confirm how to make use of results better suited for consumer innovation. The dependent variables are same as above, while the independent variables are consists of the followings: (1) “Results are shared in the community for free”; (2)

“Many problems are solved in the community”; (3) “Results are adopted and commercialized by a firm” and control variables.

(1) “Results are shared in the community for free” (EPI: $p < 0.1$; NPD: $p < 0.05$) and (3) “Results are adopted and commercialized by a firm” (EPI: $p < 0.05$; NPD: $p < 0.1$) were significant pluses for both types of consumer innovations, while, (2) “Many problems are solved in the community” was not significant.

Variables	Consumer innovation			
	EPI		NPD	
	Coff.	Std. Err.	Coff.	Std. Err.
I currently get monetary rewards	1.293***	0.267	1.550***	0.277
I received monetary rewards in the past	0.962***	0.227	1.182***	0.241
I want to get monetary rewards in the future	0.227	0.198	0.445**	0.215
Gender	0.263	0.175	0.125	0.182
Less than 40 years old	0.398**	0.172	0.331*	0.185
University student	0.383	0.341	0.574*	0.341
Employee	0.229	0.204	0.141	0.216
Top manager	0.135	0.339	0.173	0.353
Constant	1.950***	0.217	2.040***	0.229
Observations	424		424	
Pseudo R-squared	0.157		0.187	
Log likelihood	-154.6		-139.1	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6. Monetary incentive and consumer innovation

4.0 Discussion

This study suggests that social media and their network communities are useful for consumer innovation. Such network communities have two merits for consumer innovation: Firstly they get other community members’ support and secondly they enable access to experts outside the community to whom a community member might have a connection or have knowledge about. A consumer innovator helps other members, because he/she has received benefits from others’ ideas. Consumer innovators support other members because of they themselves got recognition and encouragement from other members, and are therefore happy to give others advice as an expert. However, he/she may not trust the community as a whole. The consumer innovator may trust all the members of the community, but he / she knows that there are some members who are talented or who know other talented persons outside the community. He / she expects the members to support him/her when he / she is in

trouble. Due to that, consumer innovators support each other. This means reciprocity. Moreover, support from community members who knows an expert without the community indicates the value of weak ties (Granovetter, 1973). Granovetter (1973) points out that networks connected with weak ties have high information availability. By filling in gaps between networks, it becomes easier to acquire new information and resources by connecting relationships with other networks members. In such cases, contact with people who have not been contacted previously increases opportunities to access new information and innovative ideas, and it triggers innovation. This point also applies to a virtual network community in which the current user loosely connects with social media. In addition, Granovetter (1973) pays attention not only to the central connection but also to the marginal connection. Early innovators are the peripheral persons. However the central connection is important for innovation. In an innovation network, the strength of a strong tie by internal members is demonstrated (Krackhardt, 1992). Members exchange closely with each other, sharing values and behaviour patterns, transferring and sharing knowledge, and promoting innovation as a result.

Therefore, both the connection of community members themselves and the connections outside the community are important for consumer innovation.

In addition, the lead user who is consumer innovator conducts consumer innovation (von Hippel, 1986). Also the administrator of community is beneficial to consumer innovation above general member.

Lead users may play a central role in the network community. He/she is a cutting-edge member in his/her field, and wants to use new products as soon as possible. Our study suggest that the results of consumer innovation are not only shared in the community for free but also commercialized by firms. Monetary incentive is very important for consumer innovation, too. He/she received monetary rewards in the past and currently gets monetary reward from firms; he/she wants to get monetary rewards in the future. This result is different from previous research (Lakhani & von Hippel, 2003; Raasch and von Hippel, 2013). Raasch and von Hippel (2013) find “individuals can gain significant benefits from participating in an innovation process,” “important examples of innovation process benefits include enjoyment, learning and reputational gains,” and “when innovation project sponsors can offer volunteer innovators such benefits, the net cost of innovation projects can be much lower.”

However, based on the results of this analysis, we found that not only the pleasure of participating in the innovation process but also financial incentives are very important for consumer innovation.

5.0 Conclusion

In this paper, social media usage and its community are found to be effective for consumer innovation in Japan through the analyses of questionnaire a survey. In addition, this paper also examines what kind of motivation promotes consumer innovation in Japan. Consumer innovators are still a minority in Japan. However, particularly in the younger generation, innovators will collaborate with other members and improve and develop products by using social media.

In order to promote consumer innovation, Japanese firms need to find consumer innovators, to cooperate with them in developing products, and to commercialize them. The lead user who is the centre of consumer innovation plays also a central role in the network community. Because of that, top management and employees should join the network communities which relate to their work and contact administrator and active users. In so doing, they find lead users and their collaborators. They also should advise and support other network members. If lead users have great ideas or make prototypes, firms should actively commercialize them.

However, this study has some limitations. First, because of web survey, this data has bias that it does not contain data of people who are not using the Internet. However, we think that this data is acceptable because the percentage of social media user and consumer innovator of this data are similar to other preceding surveys. Secondly, our data is restricted to Japan. Similar investigations in other countries will be required in the future in order to identify success factors of consumer innovation.

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