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Empirical Study on How Social Media Promotes Product Innovation

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Abstract

Social media such as SNS, Twitter, and the blogs has been spreading all over the world, and a large number of firms recognize social media as new communication tools for obtaining information on consumer needs and market for developing new goods and services and promoting marketing. In spite of increasing its use in the reality, academic research on whether or how social media contributes to promoting product innovation is not enough yet. This study thus attempts to analyze empirically how social media use enhances product innovation based on the survey data to Japanese firms using statistical method such as ordered probit analysis. This study finds that consumers’ cooperation via social media is indispensable for effective social media use of firms. All of three managerial orientations such as prototyping, corporate initiatives, and cooperation with consumers are effective to using social media for innovation. Firms use social media effectively for communicating tools not only outside but also inside the firm. Social media is found to support firms to obtain the

market trend, and consumer needs and reputation of existing products, and to promote product innovation.

Keywords: social media, product Innovation, ordered probit analysis, factor analysis, R&D orientation

1. Introduction

Social media such as SNS (Social Network Service/Social Network Site), Twitter, and the blogs (a short form of 'web log') has been spreading all over the world. The large number of active users of Facebook that is the largest social media in the world increases to exceed 1.28 billion (as of March, 2014) (Facebook, 2014). Moreover, 49.65 million users of SNS (diffusion 52%, as of the end of December in 2012) became in Japan and it is expected to reach 63.21 million at the end of 2015 (ICT General Laboratory and 2013).

Social media that began serving at early time such as Facebook (establishment in 2004) and Twitter (establishment in 2006) have spread among users of the personal computers. However, in accordance of an increase in smartphones users, the users of social media through smartphones increase. In particular, the number of users through smartphones using LINE increases in comparison with those via PCs (ICT General Laboratory and 2013). The number of social media users will be expected to increase more and more as smartphones diffuse further in the future.

In these circumstances, a number of firms comes to recognize social media as new communication tools for obtaining information on consumers' needs and market for developing new goods and services, and for promoting marketing. In particular, industries such as automobile, PC, mobile phones, transportation and finance came to utilize widely

social media. In spite of increasing its popularity in the real society, academic research on whether or how social media contributes to promoting product innovation remains few (Idota et al., 2011; 2014, Haavisto, 2012, for example). One reason is that it is less intuitive to recognize how social media leads to innovation. This study thus attempts to empirically analyze how social media use enhances product innovation.

2. What is social media

Kaplan and Haenlein (2010) defines 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 et al (2005), but they do not define clearly Web 2.0. Although the roles of senders and recipients of information were fixed in the past Web, everyone can become both a sender and recipient of information in current Web and now it becomes dynamic and interactive communications means. Thus, social media can be defined as a series of services for a general user to express individual's interest, concern, feeling, experience, and knowledge, etc., as contents of character, numerical value, signal, music, and the photograph and animation, etc., and to open them to the public via the Internet or to share them with specific members of the Internet.

Various services are included in social media. For instance, Kaplan and Haenlein (2010) classifies six types of social media as shown in Table 1, from the viewpoint of social presence or media richness and self- presentation or self-disclosure such as (1) Blogs, (2) SNS (e.g., Facebook), (3) virtual social worlds (e.g., Second life), (4) Cooperative projects (e.g., Wikipedia), (5) Content communities (e.g., Youtube), and (6) Virtual game worlds (e.g., World of Warcraft).

Table 1. Classification of social media

		Social presence / Media richness		
		Low	Medium	High
Self-presentation/ Self-disclosure	High	Blogs	Social Networking Site (e.g., Facebook)	Virtual social worlds (e.g., Second life)
	Low	Cooperative projects (e.g., Wikipedia)	Content communities (e.g., Youtube),	Virtual game worlds (e.g., World of Warcraft)

Sources: Kaplan and Haenlein (2010), p. 62

3. Social media use in the firm

The diffusion of social media has large influence on the business activities of firms. Previous studies show social media brings business opportunities to firms, while it may turn to be a threat for them because firms may not control it directly. Regarding former, Rodriquez et al (2012) clarifies social media use influences positively to both the sales process and its results, that is, social media is a good chance to promote sales, since it is beneficial for firm to learn from consumers and establish a new market segment and long-run positioning. It is also useful for constructing mutual trust with consumers and raising the economic value for consumers (Noone et al., 2011; Kate & Pavan, 2012). Information that consumers exchange through social media contains useful contents for a product improvement and a new marketing strategy (Haavisto, 2012). In other words, social media brings opportunities of CRM (Customer Relationship Management) (Malthouse et al., 2013). So-called word of mouth in social media becomes an effective means to obtain potential customers, sales improvement, and the improvement of the brand image (Luo & Zhang, 2013; Hausmann, 2012). Regarding the latter, negative aspects, however, consumers hesitate to buy products referred by social media because of reading bad reputation posted in social media, which causes LTV (Life Time Value) low (Malthouse et al., 2013). Thus, social media are double-edged swords for business but firms tend to use social media positively for their businesses.

4. Social media and product innovation

Firms are required to mobilize all managerial resources and networks to corresponding to changes in consumer needs and market and to achieve innovation. The innovation process in this context is postulated as follows: Firms perceive outside information on new technologies or shifts in consumer tastes, assimilate them with existing knowledge and resources inside the firm, and transform new information or knowledge into innovation (Zahra and George, 2002; Fosfuri and Tribo, 2008). ICT (Information and Communication Technology) such social media has been regarded as a tool that not only improves the productivity of firms but also enhances innovation. ICT improves greatly the ability to obtain and share information; it enables the identification of new findings from big data on the real time basis and facilitates to share information among various related entities. These ICT features lead to innovation, and it becomes one of the essential bases for promoting innovation (Dodgson et al., 2006; Lee & Xia, 2006; Idota et al., 2012). These are examples of ICT use inside the firm, while ICT also supports collaboration with entities outside the firm, such as other related firms, universities, local research institutions, and consumers. In these processes, ICT transmits a much larger volume of information at much faster speeds than face-to-face communications. The information networks thus constructed are referred to as open innovation (Chesbrough, 2003, 2006a, 2006b). In the open innovation process, a strategy for sharing information and resources with other firms located in any segment of supply chain is required, since ICT can expedite sharing information related to innovation (Tsuji and Miyahara, 2010, 2011).

Especially, social media has recently been introduced and utilized by a large number of firms. In firms, blogs are used to transmit and share work-related information. Managers, for instance, send messages to their subordinates via social media, which functions as a bulletin board posting an administrative report, in-house rules, news of employees, and so on. A working team needs to share specific information such as on the daily report, the project,

customers, market, and technology through social media. Social media thus can activate in-house communications. It is reported that even the simple use of social media among employees promotes innovation (Idota et al., 2011). Moreover, social media can be used for obtaining useful consumer needs for product innovation and enables collaboration with entities outside the firm. As mentioned above, a large number of studies examining the roles of social media in business focuses mainly on marketing and sales force; they analyze how social media is utilized for advertising their products, sampling consumer needs, reputation of products, and so on (Noone et al., 2011; Agnihotri et al., 2012; Groza et al., 2012; Haavisto, 2012; Hausmann, 2012; Kate & Pavan, 2012; Rodriguez et al., 2012; Schultz et al., 2012; Luo & Zhang, 2013; Malthouse et al., 2013). Useful contents for product improvement and a new marketing strategy are contained in information that users exchange through social media (Haavisto, 2012). Moreover, firms can contact with opinion leaders by identifying from the source of information which is exchanged in social media. These are especially necessary for the product innovation of goods and services for consumers.

5. Methodology

5.1 Research questions

As explained in the previous section, social media is a meaningful tool to communicate with not only consumers but also colleagues of teams or firm as a whole. The objectives of this study are thus to examine whether and how social media promotes product innovation. In so doing, this paper postulates the following research questions: (i) What are the roles of consumers in the innovation process; (ii) How firms are implementing social media for innovation; and (iii) What type of activities related to social media in new product development firms consider being important. Moreover, the followings are also attempted to

clarify: (iv) Among firms collaborating with consumers, what kind of firms think social media being important; and (v) Among firms which consider social media being important to product innovation, what kind of innovation activities are taken. There is no need to explain except (iv) and (v) which are aimed to examine the characteristics of firms which are successfully using social media.

5.2. Questionnaire and data

The analysis employs the data obtained from authors' mail survey of product innovation and social media use conducted in February 2014; the questionnaire was sent to 2,000 firms throughout Japan. The firms were selected from industries which have possibility to use social media such as automobile, apparel, electric machinery, consumer electronics, medicine, cosmetics, soap, detergent, beverage, food, telecommunications, software, restaurant, department store, supermarket, other retailing, trading company, wholesale, travel agent, transportation (e.g., railway and airline), construction, bank, brokerage, insurance, and other industries. Among these industries, the number of firms which successfully implementing social media is expected to not so large, and they were selected from previous surveys on social media and marketing, innovation, and so on. The data contains listed and non-listed firms, and regional quota was not considered.

Under these setting, 70 (3.5%) valid responses were received, and the summary of replies to specific questions is shown in Table 2, in which *Achievement of product innovation in 2011-2013* takes 2, if firms achieved entirely are goods and services, 1, if they achieved improvement of existing commodities, and 0 if there was no such innovation. As for question *Importance of social media about product innovation*, 2, 1, and 0 is given to firms which replied to *yes*, *not decided*, and *no*, respectively. In Orientations toward social media, the values of *Max* and *Min* were obtained by factor analysis.

Table 2. Descriptive statistics of replies to selected questions

Variables		Obs.	Mean	Std. Dev.	Min	Max
Achievement of product innovation in 2011-2013		70	1.671	0.717	0	2
Importance of social media to product innovation		67	1.209	0.664	0	2
Social media use (Yes or No)	Owing Official accounts	68	0.574	0.498	0	1
	Owing community sites	69	0.159	0.369	0	1
	Owing in-house use of social media	69	0.188	0.394	0	1
Years of operation		65	63.554	49.239	3	271
Capital (ln) (unit: Japanese Yen)		65	3.253	1.099	1	5.7741
Industry	Manufacturing	70	0.429	0.498	0	1
	Service	70	0.386	0.490	0	1
	Other industries	70	0.186	0.392	0	1
Orientations toward social media	Consumer orientation	59	0.000	0.967	-2.477	1.8351
	Prototype orientation	65	0.000	0.881	-0.708	2.8592
	Initiative orientation	65	0.000	0.996	-1.486	0.8354
	Collaboration orientation	65	0.000	0.832	-0.715	3.4163
Importance of items in collaborating with consumers (five scales)	Developing the concept of goods and services	63	3.492	1.014	1	5
	Evaluating the concept of goods and services	63	3.683	1.148	1	5
	Decision on function and content of goods and services	63	3.270	1.003	1	5
	Decision on design package	63	3.048	1.099	1	5
	Decision on brand name	63	2.746	1.077	1	5
	Decision on sales price	62	3.161	1.011	1	5
	Proposal of how to use	63	3.476	1.030	1	5
	Proposal of easy maintenance in daily use	62	3.065	1.186	1	5
	Proposal of the abandonment method	62	2.629	1.090	1	5
	Evaluating PR projects and events	62	3.306	1.080	1	5
Actions taken for new product development (No=0, Yes = 1)	Evaluation of characters and talents of advertisement or commercial	62	2.871	1.166	1	5
	Ideas of product development are discovered by questionnaire and word of mouth	65	0.585	0.497	0	1
	Ideas of new goods and services are obtained by exchanging with opinion leaders.	65	0.277	0.451	0	1
	Appointing persons in charge of product development who knead concepts of products based on discovered ideas.	65	0.692	0.465	0	1
	Software, equipment, tools, etc. are lent to consumers so that they can make a prototype by themselves.	65	0.031	0.174	0	1
	Presenting trial plans until a prototype is made, and consumers' reactions are collected.	65	0.154	0.364	0	1
	Trial parties or trail usage of a prototype are offered to consumers.	65	0.200	0.403	0	1
	Pricing, advertising expressions, and packages are presented to consumers to obtain their opinions, and their opinions are consolidated.	65	0.138	0.348	0	1
	Consolidating results of consumer opinions is opened to the public via the web.	65	0.046	0.211	0	1
	To rouse consumers' interest in products, firms urge them to recommend it to others.	65	0.154	0.364	0	1
For consumers to solicit to friend, events and campaigns are held.		65	0.246	0.434	0	1
	Opportunities such as discussing problems in use and exchanging opinions for improvement after purchased are offered.	65	0.123	0.331	0	1
	Asking to consumers about ideas improving products	65	0.154	0.364	0	1

Source: Authors

5.3. Methodology and construction of variables

This study employs ordered probit analysis to examine the relationship between innovation and social media, some of questions in the questionnaire as well as new variables which are constructed from questions are used. It is necessary to specify potential variables which cause innovation, which are referred to as *factors* in what follows. For this purpose, factor analysis is applied and the maximum likelihood method (Varimax Rotation) is employed. Table 3 indicates the result of factor analysis which aims to extract a variable named *Collaboration with consumers*. The related questions were asked to the five-point Likert scale and one factors are identified as collaborating with consumers, which are related to questions such as *Decision on function and content of goods and services, Developing the concept of goods and services, Evaluating the concept of goods and services, Proposal of easy maintenance in daily use, Decision on design package, Decision on brand name*, and so on. As a result, one factor is convergent. Accordingly we denoted this factor as *Consumer orientation*.

Table 3. Factor analysis of collaboration with consumers

	Consumer orientation
Decision on function and content of goods and services	.851
Developing the concept of goods and services	.798
Evaluating the concept of goods and services	.791
Proposal of easy maintenance in daily use	.788
Decision on design package	.766
Decision on brand name	.765
Proposal of how to use	.701
Proposal of the abandonment method	.700
Decision on sales price	.677
Evaluating PR projects and events	.649
Evaluation of characters and talents of advertisement or commercial	.561
Sums of squares of loadings after extraction	54.161

Source: Authors

In addition, three factors are identified for R&D orientations. The first factor of R&D orientations consists of questions such as Presenting trial plans until a prototype is made, and consumers' reactions are collected, Pricing, advertising expressions, and packages are

presented to consumers to obtain their opinions, and their opinions are consolidated, For consumers to solicit to friend, events and campaigns are held, Trial parties or trail usage of a prototype are offered to consumers, and Opportunities such as discussing problems in use and exchanging opinions for improvement after purchased are offered. Accordingly we denoted this first factor as Prototype orientation. As for the second factor, questions such as Appointing persons in charge of product development who knead concepts of products based on discovered ideas, and Ideas of product development are discovered by questionnaire and word of mouth are extracted, and therefore these are singled out and referred to as Initiative orientation. The third factor consists of Ideas of new goods and services are obtained by exchanging with opinion leaders, Software, equipment, tools, etc. are lent to consumers so that they can make a prototype by themselves, and Consolidating results of consumer opinions is opened to the public via the web, which is named as Collaboration orientation (Table 4).

Table 4. Factor analysis of R&D orientations

	Prototype orientation	Initiative orientation	Collaboration orientation
Presenting trial plans until a prototype is made, and consumers' reactions are collected.	.780	-.078	.075
Pricing, advertising expressions, and packages are presented to consumers to obtain their opinions, and their opinions are consolidated.	.589	.074	.033
For consumers to solicit to friend, events and campaigns are held.	.544	.299	-.230
Trial parties or trail usage of a prototype are offered to consumers.	.470	-.028	.134
Opportunities such as discussing problems in use and exchanging opinions for improvement after purchased are offered.	.444	.034	.216
Appointing persons in charge of product development who knead concepts of products based on discovered ideas.	-.040	.972	.133
Ideas of product development are discovered by questionnaire and word of mouth	.195	.402	-.204
Ideas of new goods and services are obtained by exchanging with opinion leaders.	-.097	.196	.684
Software, equipment, tools, etc. are lent to consumers so that they can make a prototype by themselves.	.213	-.137	.519
Consolidating results of consumer opinions is opened to the public via the web.	.114	-.076	.515
Factors Correction Matrix			
1	1.000	.344	.111
2	.344	1.000	.242
3	.111	.242	1.000

Source: Authors

5.4. Estimation result I

(1) Innovation and social media in general

This study employs ordered probit analysis which enables to clarify the relationships between innovation and social media. In the first estimation, the explained variable is Achievement of product innovation in the recent three years, while the explanatory variables are selected from questions which consist of the followings: (i) Importance of social media to product innovation; and (ii) firm characteristics such as years of operation, industry, and size of firm. In other words, this examines whether firms which recognize the importance social media tend to have more innovation. The result of estimation is shown on Table 5, and Importance of social media to product innovation is found to be significant for product innovation (0.57, P=0.07).

Table 5. Social media and Innovation

	Product innovation Coef. / t value
Importance of social media to product innovation	0.57 1.81*
Operation years	-0.003 -0.83
Capital (ln)	0.033 0.16
Manufacturing	0.182 0.43
Other industries	5.139 0.01
Cut1/Constant	-0.205 -0.26
Cut2/Constant	-0.053 -0.07
log-likelihood	-30.132
Pseudo R ²	0.155
N	61

Note: * p<0.1, ** p<0.05,*** p<0.001

Source: Authors

(2) Innovation and types of social media use

Next, let us examine how firms which are considered social media important to product innovation use social media. In so doing, taking importance of social media to product innovation as an explained variable, while the important explanatory variables included are as

following three social media uses: (i) Owing official accounts; (ii) Owing community sites; and (iii) Owing in-house use of social media. Other control variables are selected from firm characteristics such as years of operation, industry, and size of firm (Table 6). In Table 6, the first column indicated All shows the model in which above three variables are included, while other three cases contain one of three variables.

Regarding the results of estimations, in case All Owing official accounts (1.113, $p=0.00$) and Owing community site (0.911, $p=0.08$) are significant. Regarding other individual cases, the following variables are found to be significant for importance of social media about product innovation. (i) Owing official accounts (1.186, $p=0.00$); (ii) Owing community sites (1.089, $p=0.03$); and (iii) Owing in-house use of social media (0.726, $p=0.09$). Among other controlled variables, the following two are significant, namely Operation year (-0.007, $p=0.03$); and Manufacturing (1.085, $p=0.00$; 0.674, $p=0.05$; 0.77, $p=0.02$).

Table 6. Importance of social media to product innovation and social media use

Social media use	Importance of social media to product innovation			
	Coef. / t value			
	All	1	2	3
1. Owing official accounts	1.113 3.18***	1.186 3.49***		
2. Owing community sites	0.911 1.78*		1.089 2.23**	
3. Owing in-house use of social media	0.349 0.75			0.726 1.69*
Operation years	-0.006 -1.74*	-0.004 -1.15	-0.007 -2.14**	-0.003 -1.15
Capital (ln)	-0.055 -0.33	-0.084 -0.51	-0.06 -0.37	-0.087 -0.54
Manufacturing	0.978 2.62***	1.085 2.99***	0.674 1.97]*	0.77 2.28**
Other industries	0.662 1.30	0.769 1.54	0.288 0.63	0.421 0.92
Cut1/Constant	-0.698 -1.04	-0.65 -0.98	-1.421 -2.31**	-1.232 -2.00**
Cut2/Constant	1.201 1.75*	1.137 1.70*	0.228 0.38	0.375 0.62
log-likelihood	-46.996	-49.255	-53.749	-54.898
Pseudo R ²	0.207	0.169	0.104	0.085
N	60	60	61	61

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

Source: Authors

(3) Orientations toward social media

Next, we examine how firms which think social media being important to product innovation tend to have attitudes toward social media use. In this case, the explained variable is Importance of social media to product innovation, while the explanatory variables are constructed by the following four orientations: (i) Consumer orientation; (ii) Prototype orientation; (iii) Initiative orientation; and (iv) Collaboration orientation. In addition to these, firm characteristics such as years of operation, industry, and size of firm are included (Table 7). Again in estimation, the first column indicated All shows the model in which above four orientations are included, while in other four cases indicated, one of four variables is included for estimation.

Regarding the results of estimations, if four orientations are taken together in the estimation equation, that is, case All, Consumer orientations (0.499, $p=0.03$) and Collaboration orientation (0.79, $p=0.03$) are significant. In the separated cases, the following variables are significant for importance of social media to product innovation: (i) Consumer orientation (0.538, $p=0.00$); (ii) Prototype orientation (0.424, $p=0.03$); (iii) Initiative orientation (0.333, $p=0.04$); and (iv) Collaboration orientation (0.664, $p=0.01$). In addition to these, Manufacturing (0.951, $p=0.01$; 0.89, $p=0.01$) and Other industries (0.965, $p=0.01$) are also significant.

Table 7. Importance of social media to product innovation and R&D orientations

	Importance of social media to product innovation				
	Coef. / t value				
	All	1	2	3	4
1. Consumer orientation	0.449 2.18**	0.538 2.95***			
2. Prototype orientation	0.221 0.77		0.424 2.12**		
3. Initiative orientation	0.227 0.98			0.333 2.05**	
4. Collaboration orientation	0.79 2.23**				0.664 2.71***
Operation years	-0.003 -0.89	-0.003 -1.05	-0.003 -1.14	-0.004 -1.30	-0.004 -1.30
Capital (ln)	-0.411 -1.98*	-0.227 -1.23	-0.123 -0.72	-0.062 -0.37	-0.133 -0.77
Manufacturing	0.97 2.06**	0.951 2.48**	0.517 1.40	0.517 1.41	0.89 2.50**
Other industries	1.506 2.33**	0.965 1.79*	0.445 0.95	0.149 0.32	0.612 1.26
Cut1/Constant	-2.591 -3.24***	-1.771 -2.64***	-1.541 -2.41**	-1.459 -2.29**	-1.524 -2.36**
Cut2/Constant	-0.193 -0.28	0.184 0.29	0.052 0.09	0.127 0.21	0.116 0.19
log-likelihood	-35.392	-42.404	-51.887	-52.115	-49.805
Pseudo R ²	0.326	0.193	0.099	0.095	0.135
N	54	54	58	58	58

Note: * p<0.1, ** p<0.05, *** p<0.001

Source: Authors

5.3 Estimation results II

Here we examine in more detail how firms collaborate with consumer and what kind of activities they are engaged in to achieve product innovation. We aimed to examine the relationship between social media use and innovation, but the number of firms which achieved innovation is small and they may not be a good outcome taken as the explained variable. We therefore focus on firms which corresponded that they consider social media important.

(1) Collaboration with consumers

This section examines by focusing firms which consider social media as important factors and examining what kind of collaborations with consumers they are engaging in. In other words, what are objectives for them to collaborate with consumers is analyzed. Again *importance of social media to product innovation* is taken as the explained variable, while the explanatory

variables are listed in Table 3. Those are as follows: (1) Developing the concept of goods and services; (2) Evaluating the concept of goods and services; (3) Decision on function and content of goods and services; (4) Decision on design package; (5) Decision on brand name; (6) Decision on sales price ; (7) Proposal of how to use; (8) Proposal of easy maintenance in daily use; (9) Proposal of the abandonment method; (10) Evaluating PR projects and events; and (11) Evaluation of characters and talents of advertisement or commercial. In estimation, only one of the above variables is included in an equation. Other variables of firm characteristics such as Operation years, Capital (ln), Manufacturing, and Other industries are controlled. The results of estimation are shown in Table 8. As a result, all of the above variables except 6. Decision on sales price and 10. Evaluating PR projects and events are found to be significant.

(2) R&D activities

Here we analyze what kind of activities firms which think social media being important conduct in new product development are engaging in more detail. The explained variable is again importance of social media to product innovation, while the explanatory variables are selected from questions, which consists of the followings: (i) questions consisting of Actions taken for new product development in Table 2; and (ii) firm characteristics such as years of operation, industry, and size of firm.

As the result shown in Table 9, 1. Ideas of product development are discovered by questionnaire and word of mouth (0.629, $p=0.06$), 2. Ideas of new goods and services are obtained by exchanging with opinion leaders (1.068, $p=0.00$), 3. Appointing persons in charge of product development who knead concepts of products based on discovered ideas (0.76, $p=0.03$), and 5. Presenting trial plans until a prototype is made, and consumers' reactions are collected (0.91, $p=0.06$) become significant.

Table 8. Collaboration with consumers

Collaboration with Consumers	Importance of social media about product innovation											
	Coef. / t value											
	1	2	3	4	5	6	7	8	9	10	11	
1. Developing the concept of goods and services	0.456											
	2.70**											
2. Evaluating the concept of goods and services		0.4										
		2.67***										
3. Decision on function and content of goods and services			0.555									
			3.19***									
4. Decision on design package				0.33								
				2.24**								
5. Decision on brand name					0.459							
					2.91***							
6. Decision on sales price						0.142						
						0.93						
7. Proposal of how to use							0.672					
							3.68***					
8. Proposal of easy maintenance in daily use								0.285				
								2.04**				
9. Proposal of abandonment method									0.327			
									2.11**			
10. Evaluating PR projects and events										0.17		
										1.07		
11. Evaluation of characters and talents of advertisement or commercial											0.297	
											2.06**	
Operation years	-0.004	-0.003	-0.003	-0.004	-0.005	-0.004	-0.005	-0.004	-0.005	-0.003	-0.005	
	-1.28	-1.01	-0.95	-1.34	-1.67*	-1.34	-1.66*	-1.23	-1.54	-1.10	-1.55	
Capital (ln)	-0.186	-0.152	-0.047	-0.089	-0.108	-0.092	-0.215	-0.126	-0.15	-0.137	-0.167	
	-1.07	-0.88	-0.27	-0.52	-0.63	-0.55	-1.18	-0.73	-0.86	-0.75	-0.96	
Manufacturing	0.765	0.646	0.838	0.741	0.937	0.854	0.609	0.873	0.924	0.9	0.873	
	2.12**	1.76*	2.30**	2.05**	2.58***	2.43**	1.63	2.39**	2.54**	2.47**	2.45**	
Other industries	0.566	0.541	0.7	0.615	0.747	0.697	0.669	0.736	0.923	0.708	0.706	
	1.13	1.08	1.38	1.24	1.48	1.42	1.29	1.46	1.82*	1.33	1.43	
Cut1/Constant	-0.202	-0.216	0.501	-0.441	-0.275	-0.892	0.15	-0.603	-0.71	-0.864	-0.805	
	-0.27	-0.29	0.58	-0.59	-0.38	-1.14	0.20	-0.83	-1.02	-1.00	-1.18	
Cut2/Constant	1.567	1.562	2.354	1.294	1.537	0.741	2.096	1.145	1.03	0.838	0.895	
	2.03**	2.01**	2.61***	1.71	2.06**	0.95	2.62***	1.57	1.48	0.97	1.3	
log-likelihood	-46.833	-46.926	-45.201	-48.092	-46.177	-50.248	-42.967	-46.958	-46.801	-48.377	-48.513	
Pseudo R ²	0.142	0.14	0.172	0.119	0.154	0.079	0.213	0.123	0.126	0.097	0.111	
N	56	56	56	56	56	56	56	55	55	55	56	

Source: Authors

Table 9. Importance of social media to product innovation and actions taken for new product development

Actions taken for new product development	Importance of social media to product innovation											
	Coef/t value											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Ideas of product development are discovered by questionnaire and word of mouth	0.629 1.86*											
2. Ideas of new goods and services are obtained by exchanging with opinion leaders.		1.068 2.75***										
3. Appointing persons in charge of product development who knead concepts of products based on discovered ideas.			0.76 2.20**									
4. Software, equipment, tools, etc. are lent to consumers so that they can make a prototype by themselves.				5.648 0.02								
5. Presenting trial plans until a prototype is made, and consumers' reactions are collected.					0.91 1.91*							
6. Trial parties or trail usage of a prototype are offered to consumers.						0.602 1.48						
7. Pricing, advertising expressions, and packages are presented to consumers to obtain their opinions, and their opinions are consolidated.							0.742 1.51					
8. Consolidating results of consumer opinions is opened to the public via the web.								5.592 0.03				
9. To rouse consumers' interest in products, firms urge them to recommend it to others.									0.329 0.77			
10. For consumers to solicit to friend, events and campaigns are held.										0.384 1.03		
11. Opportunities such as discussing problems in use and exchanging opinions for improvement after purchased are offered.											0.527 1.15	
12. Asking to consumers about ideas improving products.												0.34 0.80
Operation years	-0.005 -1.62	-0.005 -1.47	-0.004 -1.30	-0.004 -1.32	-0.004 -1.25	-0.005 -1.52	-0.003 -1.08	-0.003 -1.16	-0.004 -1.28	-0.004 -1.28	-0.004 -1.20	-0.004 -1.26
Capital (ln)	-0.049 -0.29	-0.175 -0.98	-0.066 -0.39	-0.066 -0.40	-0.102 -0.60	-0.086 -0.51	-0.087 -0.52	-0.044 -0.26	-0.05 -0.32	-0.079 -0.47	-0.076 -0.45	-0.081 -0.47
Manufacturing	0.609 1.71*	0.927 2.59***	0.526 1.45	0.839 2.41**	0.555 1.53	0.717 2.06**	0.628 1.77*	0.807 2.30**	0.749 2.17**	0.672 1.89*	0.781 2.26**	0.767 2.23**
Other industries	0.097 0.20	0.673 1.38	0.16 0.34	0.418 0.90	0.461 0.98	0.499 1.04	0.428 0.92	0.254 0.53	0.305 0.66	0.297 0.64	0.391 0.84	0.356 0.77
Cut1/Constant	-1.02 -1.63	-1.339 -2.11**	-0.95 -1.49	-1.211 -1.97**	-1.327 -2.14**	-1.261 -2.03**	-1.24 -2.02**	-1.13 -1.82*	-1.18 -1.92*	-1.26 -2.05**	-1.20 -1.96*	-1.246 -2.03**
Cut2/Constant	0.539 0.87	0.298 0.49	0.648 1.03	0.332 0.56	0.247 0.41	0.286 0.48	0.301 0.51	0.441 0.73	0.34 0.57	0.267 0.45	0.335 0.56	0.274 0.46
log-likelihood	-52.505	-50.23	-51.792	-52.865	-52.36	-53.137	-53.075	-51.217	-53.958	-53.722	-53.584	-53.93
Pseudo R ²	0.088	0.127	0.1	0.082	0.09	0.077	0.078	0.11	0.063	0.067	0.069	0.063
N	58	58	58	58	58	58	58	58	58	58	58	58

Source: Authors

6. Implication

Thus this study shows that among Japanese leading firms, social media is aimed to use for innovation. Such firms have official accounts and original community sites to communicate with consumers. Similarly, in-house social media is used for the promotion of information sharing and knowledge creation. The results of this study are similar to authors' previous research (Idota, et al, 2012). These firms understand advantages social media for communicating with outside entities as well as with those inside the firm. Moreover, they understand the value of social media as collaborating with consumers in the process of product development and upgrading. They also aim to collaborate with consumers closely for making the concept of new goods, deciding of package design and brand name, and proposing how to use products and how to dispose them.

The results show that the importance of social media will be increasing more to the types of business which provide goods and services for final consumers in the future. However, the firms which make product innovation successful by using social media positively are not conducting product development from consumers' initiation, but from their initiatives to obtain the idea of the product development through questionnaires, word of mouth, and exchanging with the opinion leaders. Employees in charge of development knead those ideas according to their own technology and knowhow, and they make prototypes, that is, they make final commodities by taking consumer opinion as a source of ideas and confirming the difference between their images and actual needs through consumer evaluation of prototypes. Consumers evaluate those prototypes. In such firms, employees in charge of development value consumer create the concept of commodities by taking their own ideas as a professional of product development. Social media therefore is important for the firms that establish such a product process.

7. Conclusions

In this paper, social media is found to be useful for the innovation through the analysis of the questionnaire survey. In addition, how firms use social media, what kind activates they are engaging in the collaboration with consumers. Moreover, social media plays an important role in the innovation process is clarified from the result of the analysis, though number of valid response was small in this questionnaire.

The consumer's cooperation via social media is also indispensable for the effective use of social media. All of the three orientations toward social media use such as prototyping, corporate initiatives, and cooperation with the consumer are effective for innovation. Firms use effectively social media not only outside the firm but also inside the firm. In sum, social media supports firms to grasp the market trend, consumer needs and the reputation of existing products which are basis for innovation.

The number of firms that use social media for product innovation is still too small to clarify how social media is used for successful product innovation. The further case studies explaining their success will be required and then success factors will be identified.

Reference

- Agnihotri, R., Kothandaraman, P., Kashyap, R., & Singh, R. (2012). Bringing 'social' into sales: the impact of salespeople's social media use on service behaviors and value creation. *Journal of Personal Selling & Sales Management*, 32(3), 333-348.
- Boyd, D. M., & Ellison, N. B. (2008). Social network sites: definition, history, and scholarship. *Journal of Computer-Mediated Communication*, 13(1), 210-230.
doi:10.1111/j.1083-6101.2007.00393.x

Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Boston, MA: Harvard Business School Press.

Chesbrough, H. W. (2006a). Open innovation: A new paradigm for understanding industrial innovation. In H. W. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), *Open innovation researching a new paradigm* (pp. 1-12). Oxford, UK: Oxford University Press.

Chesbrough, H. W. (2006b). *Open business model: How to thrive in the new innovation landscape*. Boston, MA: Harvard Business School Press.

Dodgson, M., Gann, D., & Salter, A. (2006). The role of technology in the shift towards open innovation: the case of Procter & Gamble. *R&D Management*, 36(3), 333-346.
doi: 10.1111/j.1467-9310.2006.00429.x

Facebook (2014). Investor Relations. <http://investor.fb.com/> (last check, October 20, 2014)

Fosfuri, A., & Tribo, J. A. (2008). Exploring the antecedents of potential absorptive capacity and its impact on innovation performance. *Omega*, 36 (2), 173-187.
doi: 10.1016/j.omega.2006.06.012.

Groza, M., Peterson, R., Sullivan, U. Y., & Krishnan, V. (2012). Social media and the sales force: the importance of intra-organizational cooperation and training on performance. *The Marketing Management Journal*, 22(2), 118-130.

- Haavisto, P. (2012). Social media discussion forums and product innovation - The way forward?. *First Monday*, 17.
<http://firstmonday.org/ojs/index.php/fm/article/view/3984/3332> (last check, October 20, 2014)
- Hausmann, A. (2012). Creating 'buzz': opportunities and limitations of social media for arts institutions and their viral marketing. *International Journal of Nonprofit & Voluntary Sector Marketing*, 17(3), 173-182.
doi: 10.1002/nvsm.1420
- ICT General Laboratory (2013). Investigation concerning SNS use trend in 2013 (in Japanese).
<http://www.ictr.co.jp/report/20130530000039.html> (last check, October 2014)
- Idota, H., Bunno, T., & Tsuji, M. (2011). Empirical Analysis of Internal Social Media and Product Innovation: Focusing on SNS and Social Capital. *Proceedings of 22nd European regional ITS conference*, 1-20.
- Idota, H., Bunno, T., & Tsuji, M. (2012). Empirical Study on ICT Usage and Internal Capability for Innovation among Japanese SMEs. *Proceedings of International Telecommunications Society 2012 Biennial Conference*, Bangkok, Thailand, 1-15.
- Idota, H., Bunno, T., & Tsuji, M. (Forthcoming). Empirical Analysis of the Relationship between Social Media Use and Product Innovation: Focusing on SNS Use and Social Capital. In H. Mitomo, H. Fuke & E. Bohlin (Eds.), *The Smart Revolution toward a Sustainable Digital Society*, Cheltenham, UK: Edward Elgar.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, 53(1), 59-68.

doi: 10.1016/j.bushor.2009.09.003

Kate, V., & Pavan, S. (2012). Social Media and Revenue Management; Where Should the Two Meet?. *Journal of Technology Management for Growing Economies*, 3(1), 33-46.

Lang, E. M. (2005). Would you, Could you, Should you Blog?. *Journal of Accountancy*, 199(6), 36-42.

Lee, G., & Xia, W. (2006). Organizational size and IT innovation adoption: A meta-analysis. *Information & Management*, 43, 979-985.

doi: 10.1016/j.im.2006.09.003

Luo, X., & Zhang, J. (2013). How Do Consumer Buzz and Traffic in Social Media Marketing Predict the Value of the Firm?. *Journal of Management Information Systems*, 30(2), 213-238.

doi: 10.2753/MIS0742-1222300208

Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix, *Business Horizons*. 52(4), 357-365.

doi: 10.1016/j.bushor.2009.03.002

Noone, B. M., McGuire, K. A., & Rohlf, K. V. (2011). Social media meets hotel revenue

management: Opportunities, issues and unanswered questions. *Journal of Revenue & Pricing Management*, 10(4), 293-305.

doi: 10.1057/rpm.2011.12

Rodriguez, M., Peterson, R. M., & Vijaykumar, K. (2012). Social Media's Influence on Business-To-Business Sales Performance. *Journal of Personal Selling & Sales Management*, 32(3), 365-378.

Schultz, R. J., Schwepker, C. H., & Good, D. J. (2012). An exploratory study of social media in business-to-business selling: salesperson characteristics, activities and performance. *The Marketing Management Journal*, 22(2), 76-89.

O'Reilly, T. (2005). What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. <http://oreilly.com/web2/archive/what-is-web-20.html> (last check, October 2014)

Tsuji, M., & Miyahara S. (2010). A Comparative Analysis of Organizational Innovation in Japanese SMEs Generated by Information Communication Technology. In A. Kuchiki, & M. Tsuji (Eds.), *From Agglomeration to Innovation: Upgrading Industrial Clusters in Emerging Economies* (pp. 231-269). Basingstoke, UK: Palgrave Macmillan,.

Tsuji, M., & Miyahara S. (2011). Agglomeration and Local Innovation Networks in Japanese SMEs: Analysis of the Information Linkage In A. Kuchiki, & M. Tsuji (Eds.),

Industrial Clusters, Upgrading and Innovation in East Asia (pp. 253-294).
Cheltenham, UK: Edward Elgar.

Zahra, H., & George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, 27(2), 185-203.

doi: 10.5465/AMR.2002.6587995