

The Viral Effect of Online Social Network on New Products Promotion: Investigating Information Diffusion on Twitter

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In Twitter, a user can post a message below 140 characters on his/her account, and can also repost a message of other users who the user follows. The message posted by the user in turn can be seen and reposted by other users who follow the user, which is called Re-tweet (RT). While some messages spread widely, other messages have relatively less or no RT. What factors cause these quantity variances of RT originated from original messages? How can the messages become influential in online social networks? As an effort to answer the above questions, we focused on information vividness, message characteristics, and originator characteristics. In perspective of managerial implication, we expect that the findings of this paper will provide corporations with helpful insight on the Word-of-Mouth (WOM) effect for efficient and effective advertisements and communications when they send a message of new products or services through Social Network Services. In perspective of academic implication, we identify the effect of contents of a message on WOM, which has been dealt with by few social network researches.

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1. Introduction

Recently more versatile information and communication technologies have been increasingly embedded in our lives through the online social network service (SNS) such as Facebook and Twitter. SNS is getting more involved in

sharing people's thoughts and ideas and even further formulating public opinions, which other conventional media have not done before.

Twitter is a micro-blogging service that connects users and allows them to share information and thoughts with each other. Looking at the Twitter usage in Korea on which this study

is based, the number of users amounts to more than five million, and the number of tweets runs to almost one billion a month. Four out of 100 thousand users tweet every day and thousands of other followers read them. Thus, based on the enormous rate of usage, many firms seek to utilize Twitter as a strategic channel to communicate with customers and manage the brand reputation among them. Firms that are ranked at the top of market capitalization such as Samsung, LG, KT and Doosan have created their own Twitter sites on which the firms provide customers with various products and services-related information such as the launch of new products, product upgrades, after-sales services, and other queries.

In Twitter, a user can compose a message within maximum 140 characters. The message can be seen and reposted by other users as a retweet (RT). The RT messages can be reposted without any limitations to the number of RTs. While some messages are spread widely, others have relatively less or no RTs. RT is one of unique features that incorporate in Twitter, and the number of RTs is a salient indicator to measure the word-of-mouth (WOM) effect over online social networks. The uniqueness and importance of RT over SNS communications motivate the study to examine the role of SNS in promoting product sales through WOM effects. Thus, the study aims to identify factors that affect the number of RTs on posted messages in Twitter and investigate their impacts on firms' marketing promotions for products in the new SNS channel-Twitter.

The major research questions that specify the research motivation discussed so far are as follows; (1) What factors cause the quantity variances of RTs from original messages related to a firm's new product sales? (2) In other words, how can the messages become influential in online social media when firms launch new products? As an effort to identify the factors, the study focuses on information vividness, the characteristics of tweet messages and originator who is the first sender of tweets. Derived from two sets of regression analyses of Twitter messages collected from SocialMetrics.com, data and opinion mining company in South Korea, the results indicate that several factors such as date information, product specification description, retweet request, and characteristics of originator (sender) and follower affect the number of RTs, which means that it has more influential power for communication with customers. By dividing sampled products into IT and non-IT groups, we also examined how product type affect the number of RTs, and found that the empirical results of IT products are distinct from the ones of non-IT products. We also found a few dissimilar results between before release date and after release date.

The findings of this paper are expected to provide firms with helpful insights to enhance the influence of their messages when they send a message through Twitter or other social media sites. In addition, this paper has several implications concerning the word-of-mouth (WOM) effect for management that is important for effective and efficient advertisements and commu-

nications. From research perspectives, the study broadens our theoretical knowledge on information diffusion mechanism under online social network environment because the study sheds some new light on the influence of SNS message content on the emergence of WOM effects, which has been mostly investigated from the perspective of network structure such as network centrality and ties among members.

The rest of this paper is organized as follows. After reviewing the relevant literature in Section 2, we describe the theory and the hypotheses in Section 3. Section 4 describes the data used in the study and the empirical methodologies. Empirical results are described in Section 5. In Section 6, we discuss the theoretical implications of our results, followed by the managerial implications. Section 7 concludes the paper with a summary and limitations.

2. Literature Review

2.1 Previous Studies on the Word of Mouth Effect

Word-of-mouth (WOM) is one of the most widely accepted notions in the field of consumer studies in Marketing. It plays an important role in theoretically explaining consumers' attitudes and behaviors toward specific products and services. In an early WOM study, Katz and Lazarsfeld (1955) find that WOM is the most important source of influence in the purchase of household goods and food products. They conclude that WOM communication is seven times

as effective as newspapers and magazines, four times as effective as personal selling, and twice as effective as radio advertising in influencing consumers to switch brands of the product.

During 1960s and early 1970s, many other studies were conducted primarily with the advent of television as a major medium for promotion. Engel et al. (1969) find that almost 60 percent of the respondents recall the most influential source of influence regarding their adoption of an automotive diagnostic center as WOM. Arndt (1967) shows that respondents who received a positive WOM about a new food product are much more likely to purchase compared to those who received a negative WOM.

Since the mid-1990s, however, studies on WOM in the online context have increased with the worldwide adoption of the Internet and electronic commerce. Bansal and Voyer (2000) find the influence of interpersonal and non-interpersonal interactions on the service purchase decision. Anderson (1998) examines the relationship between satisfaction and WOM. He finds that the degree of impact of WOM is higher for extremely satisfied or dissatisfied customers, and that dissatisfied customers have more WOM activity than satisfied customers. Clemons et al. (2006) examine the ratings of the product on the Internet that can be used for recommendation, and find that the highest ratings affect the sales growth of new products.

Online conversation offers an easy and effective tool for measuring WOM (Godes and Mayzlin, 2004). Li and Hitt (2008) find that a pos-

itive WOM encourages consumers to purchase more. Mhajan et al. (1984) investigate the WOM effect as a predictor of product sales in movie industry. Eliashberg and Shugnan (1997) also find that movie critics (ratings), which represent WOM effects, play a significant role in predicting potential customers' overall perception for the movie. Elberse and Eliashberg (2003) maintain that the WOM communication would be an important predictor of film revenue : previews of the movies are highly related to opening week revenues. Previous studies insist that online recommendation sources are more influential than traditional ones (Cho and Kim, 2011; Choi and Lee, 2011; Senecal and Nantel, 2004). Zhu and Zhang (2010) find that an increase in online reviews results in higher incremental sales for products that currently have relatively low sales.

2.2 Online Social Network and WOM

Until recent years, the empirical studies of WOM have sought to understand the emergence process of WOM such as identifying influencing factors and exploring specific information diffusion mechanism through which WOM arises (Nam et al., 2011). Based on this information diffusion perspective, the studies have thus examined how WOM would link to consumers' purchasing intentions or the actual buying behaviors. However, the WOM studies have been limited to specific products or industries so far.

Since early 2000s, many of online WOM studies have been conducted in the context of

electronic commerce environment and conventional Internet portals, but not many of them in the context of social networks. Social network analysis involves the study of the relationship among the interacting individuals. SNSs have unique characteristics as new online communication services and thus a new research perspective is required. SNS does not refer to simple information delivery or transmission between the customers. Instead, it implies a mixture of the firm that sells the product, the media, and other various nodes that interact. Therefore, even without considering the product, the communication dynamics of SNS are very different compared to the previous WOM contexts. However, previous research works have not given much consideration to these differences.

In the case of social network studies, most of them have focused on the network itself, rather than on the attributes of the participating individuals (Wasserman et al., 1994; Li and Du, 2011). As the study on the network itself was widely carried out, the focus of social network study has been increasingly required to move on how the participants in SNS react to information (e.g., posted messages). Through this, firms can draw out meaningful implications and use them to understand consumers. For these reasons, there is a need for analyzing SNS in multiple perspectives rather than carrying out the research on the network itself.

Finally, the previous researches have overlooked the mechanism of triggering and enhancing the WOM effect within SNS environment. If

WOM arises on SNS, it implies that a product (or a service) takes advantageous position to grab consumers' attention and obtains high possibility to be chosen by consumers as a result. Thus, linking WOM effects to consumers' positive perception of the product or service would be another salient research area that helps both practitioners and academics understand how SNS engages in provoking WOM effects on products and services and affects firms' business performance.

3. Research Hypotheses

3.1 Measuring WOM in Online Social Network Context

The WOM effect represents the purchasing intentions of the latent consumers. Because WOM emerges in SNS with relatively less intervention of temporal and spatial limitations, the situation has more powerful impact on people's perception on products and services than WOM in offline environments usually does (Chatterjee, 2001). Then, how can we apply these WOM effects under the context of online SNS (e.g., Twitter) regarding the messages related to the launch of products posted by a firm? The WOM effect is measured by calculating the volume and speed of message redelivery, which is closely related to the change in consumers' attitudes, intention to purchase, and actual purchase of products and services.

Therefore, the study measures WOM in the context of Twitter through calculating redelivery of tweet messages in terms of volume and range.

Then, what aspect of information diffusion mechanism in Twitter should we measure? The most common approach is to use simple counts of message redelivery. This approach monitors how many times a message containing a firm's product is recited. Second, we can also investigate another dimension of WOM, dispersion. It can be defined as the extent to which product-related conversations are taking place across a broad range of communities (Godes and Mayzlin, 2004). Thus, we can expect that less dispersed WOM is likely to have less of an impact than broadly dispersed WOM.

As discussed, the retweet (RT) messages can be reposted without any limitations of the number of RTs. It can also be seen by other users (i.e., followers). In the case of the RTs, apart from the followers of the originator, even the followers of the user who has retweeted can see the message. Thus, through the RTs, messages related to a new product launch can affect existing or latent consumers. In the use of Twitter, the fact that a person is a follower means that he or she trusts and likes the following. Thus, the tweet messages themselves have the characteristics of being accepted before being retweeted and holds much impact (Song, 2011). Therefore, we have decided to use RT as the proxy of WOM and more specifically, to use the simple count of RTs in order to measure WOM.

The nature of Twitter is such that in the case of RT, not only the followers of the person who has sent the RT can see the message but also the followers of other users who have sent the same RT can do so. This means that the re-

percussion of one RT is much larger than any other offline or online WOM. Consequently, by using the simple count of the RTs, we can give consideration to the dispersion of RT. Furthermore, according to the different channels of message propagation, the impact of the messages that a firm or media gives would vary drastically. So this research would take the concept of WOM to be not only based on an individual's WOM but also to encompass the official originator's WOM.

3.2 Hypothesis Development

3.2.1 Information Vividness (Information Concreteness)

Among the factors that bring attention to a message, one salient influencer is information vividness. The vividness of a message hereby refers to how much clear and detailed information within a message is expressed or described. In information vividness, the concreteness, which depends on the degree of detail and specificity, is important in increasing the vividness of the information (Nisbett and Ross, 1980).

Vivid and specific information, compared to information that are not vivid or specific, attracts more attention from consumers and are etched in their memories for a longer period, and thus has a comparatively larger impact on the information recipient (Sundar and Kalyanaraman, 2004). Schindler and Bickart (2005) argue that online WOM is one of the factors that judge how valid the information is, which sheds light on how much detail and specific information a post is delivering.

Also messages that carry more specific information have comparatively higher credibility. Thus the messages with high information vividness become more credible to information recipients or consumers. And the more credible a message is taken to be, the larger the impact of WOM (Kim and Kim, 2010). In Twitter, hyperlink (for the detailed information), product launch date information, and product specification description all convey more details than just delivering the information of a product launch. Therefore, we can establish the following hypotheses;

Hypothesis 1a : Having a hyperlink in the tweet message will increase the number of RTs.

Hypothesis 1b : Having the date information in the tweet message will increase the number of RTs.

Hypothesis 1c : Having the spec description of the products will increase the number of RTs.

3.2.2 Message Sentiment

Mood states or sentiment may play an important role in the online WOM. Several psychological studies argue that emotions play a significant role in human decision-making (Kahneman and Tversky, 1979; Antonio, 1994; Dolan, 2002). It is therefore reasonable to assume that sentiment can drive different number of RTs in Twitter.

Negativity bias, a widely accepted explanation for the impact of a negative WOM, is a psychological tendency for people to give greater

weight to negative than positive information in making evaluations (Herr et al., 1991; Ito et al., 1998). Humans are more likely to remember negative events than positive ones (Samson, 2006). In addition, negative comments are likely to survive more easily across time and space. In other words, once raised, a negative WOM tends to spread much broader in longer period over SNS (Lariscy et al., 2004; Samson, 2006). Sentiment of messages (especially with negative direction) is expected to significantly contribute to WOM effects in Twitter. Thus, this leads to the following hypothesis;

Hypothesis 2 : *Consumers having a negative rather than a positive sentiment towards the product would increase the number of RTs.*

3.2.3 RT Request

If users want to show the messages to other subscribers in Twitter, they should follow the originators before they send the messages to their followers. For this reason, users are likely to make relationships with each other. It means that the personal relationship in virtual worlds is built at the time right after latent followers enter into a connection with the following. According to the study of Stewart (2003), trust are made and diffused between senders and receivers through the process and results of interconnection. From the perspective of message's gain-framing, receivers think that they can attain a desirable result by behaving the act which is suggested on the mes-

sage if they have a positive relationship with senders (Shen and Dillard, 2007; O'Keefe and Jensen, 2008). Therefore, we can expect that the follower would have been favorable to the originator to have followed it, and thus the request of a retweet would lead to increased RTs, because followers would think RT request will bring about desired results based on their trust. Thus, the idea leads to the following hypothesis;

Hypothesis 3 : *The presence of RT requests would increase the number of RTs.*

3.2.4 Message Originator

The size and level of WOM effects in Twitter could depend on who is talking to whom (Granovetter, 1993; Godes and Mayzlin, 2004). The source of a message and source credibility can influence response to a message. Similarly, Shin and Chang (2010) define the credibility of a source of information as the degree of credibility of the medium regardless of the message conveyed. From the business perspective, the use of the source of credibility in promotion of a product may be particularly more effective in the case of new product release. Hovland and Weiss (1951) also argue that the credibility of the medium affects communication. Credibility reduces the uncertainty of the consumers because it emphasizes reliability and reduces threat perception (Chan et al., 2006). Generally, highly credible sources are more effective in eliciting attitude changes in the desired direction (Bush and Houston, 1985). The sources of information that are

credible, compared to those that are not, induce a larger change in attitudes (Sternthal et al., 1978).

The prior studies do not show consistent results. There is a difference in online and offline, print media and broadcast media, and also in terms of countries and products. Despite this inconsistency, the differences in the sources of information in conveying the messages can be found consistently in most WOM research works. So, the effect of medium credibility on the rise of WOM is also expected to be found in the context of Twitter.

Chu and Kamal (2008) insist that acknowledged bloggers provide much more persuasive and credible information rather than the unknown originators. In respect of information sharing, responsibilities are different depending on positions which are held in the society. It means that firms have more pressure about social responsibility than other nodes because of a propensity for seeking objectivity and trust. Thus, we can expect more credible information to be sent through firms' accounts in Twitter. Therefore, in order to find out the differences in the credibility depending on the identity of message originator and also the differences between their impacts, the study has come up with the following hypothesis;

Hypothesis 4 : *There is a difference in the number of RTs in the case where the originator of the message is a firm and where the originator is not a firm.*

Although it is not always the case, RTs basically show that the follower sympathizes with the message. To follow basically entails the trust and affection of following (Song, 2011). Smith et al. (2005) insist that the more users participate in online communities or blogs, the more message communications take place on the Internet. It means that the degree of WOM effects can be affected by the number of participants. Thus, with more followers, there can be more appreciation and RTs of the message posted. To have many followers means that the probability of RTs is larger, and the idea thus leads to the following hypothesis;

Hypothesis 5 : *The larger the number of followers, the larger the number of RTs.*

3.2.5 Product Type

We can expect that consumers' reactions to new IT products are quite different from those to non-IT products since consumers do not have enough experiences and knowledge for understanding radical technological developments (Choi and Shin, 2006). Persons highly interested in IT products are normally early adopters who try to purchase a new product during the first phase of the product release, and also impassionedly spread the information about the new product to other latent consumers (Turnbull and Meenaghan, 1980). Therefore, we can infer that there are huge differences between IT and non-IT products in terms of information (or opinion) diffusion, purchase, feedbacks, etc. (Dickerson and Gentry, 1983; Rogers, 1995). In addition, from the per-

spective of product evaluation from consumers, the study of Lee et al. (2011) insist that consumers evaluate a product by its attributes such as size, color, brand, etc. As there are differences between IT and non-IT products, consumers evaluate product value by its unique attributes depending on product type. Thus, we can establish the following hypothesis;

Hypothesis 6 : *There are differences of RT numbers between IT products and non-IT products.*

3.2.6 Release Date

Firms may preannounce the launch of new products before their release date to consumers, distributors, and other stakeholders along with the information including product specification, release date, price, etc. (Eliashberg and Robertson, 1988; Robertson et al., 1995; Wu et al., 2004). Such preannouncement leads to WOM effects among consumers (Wind and Mahajan, 1987). It also can bring about changed opinions between before-release and after-release of the product. This is because when consumers face an official announcement of a new product release, they are apt to judge the product by their own subjective feelings without their actual usages or experiences. For example, if a firm exaggerates the quality of a new product through preannouncement, which will increase the expectation of latent consumers about the new product, consumers' assessments can be changed after the release or consumers' actual uses. Thus, we can establish the following hypothesis;

Hypothesis 7 : *There are differences of RT numbers between before-release and after-release of the product.*

4. Research Method

4.1 Empirical Context

A major goal of this paper is to explore what factors of tweet messages more significantly explain the WOM effect on the promotion of new products. Thus, it is essential to obtain a measure of the WOM effect and several factors for the new products included in the sample data. To fulfill these requirements, the study gathered basic information for empirical analysis such as the number of RTs, the existence of hyperlink, release date, product specification descriptions and a RT request in the message, message sentiment (i.e., positive, neutral, and negative), the identity of message originator, and product type. The data was collected from SocialMetrics.com, which is a market leader of opinion mining in South Korea. The company provides a platform where subscribers can see the statistics of Twitter-related data that represent users' response to posted tweet messages and information diffusion patterns in SNS.

Other than these message-oriented data, the study also identifies contextual factors that may cause different shapes of WOM effects within the same empirical model of analysis. First, the data set is divided into two groups; one is IT product, and the other is non-IT product. The rationale of splitting sample products by product type is that most products have different charac-

teristics that affect consumers' decision-makings such as WOM effect, attitude, and purchasing behavior. In addition, the study also divides the data set into other two groups according to release date; one is before product release, and the other is after product release. The approach aims to check how the experiences derived from actual use after release affect RT numbers or WOM effects. For instance, the attitudes to the products can be changed through actually using the products from negative to positive, which also can influence WOM effects.

4.2 Data Collection and Description

We collected Twitter messages for the period of about five months from July 1, 2011 to November 30, 2011 from the SocialMetrics.com. In order to limit the messages to the products that have been launched in the specified time period, only the messages that contain phrases "launch" and "to be released" were selected. The study used the same dataset and in order to analyze the credibility of firms and mass media separately, we coded the originator variable differently and carried out the analysis twice.

Hyperlink in Twitter is a using of shorten URL to provide more information to followers, because there is the limitation of 140 characters in tweet messages for users. Through it, the limitations of delivery of information could be overcome and it provides a more detailed and specific information to the tweet recipients. For example, when originator posts a message about the release

of new Audi A6, and wants to show how much this new model was improved through several epilogues, photos, and videos. But, through the tweet message, he or she cannot display the specific information helpful to sell more products. Then, originator can use this shorten URL linked to other pages including epilogues, photos, and videos.

Date information refers to the detailed information about when the product will be launched in the form of metric number in tweets. Product specification description can be as objective profile information of the product. For example, the release of Optimus black from LG U+ would include spec information such as 4-line qwerty, MDM6600+nVidia AP25 (1.2GHz dual), 4.0 NOVA display (700nit ver.), and 1GB DDR2 RAM on top of simply saying that the product will be launched. RT request can be defined as a kind of request from originator like "please, retweet this message." Originator is the first sender of the message. In this study, originators were divided into firms and non-firms in order to test Hypothesis 4 which is related to the source credibility. Follower refers to the number of people who are following the sender of the given message.

5. Analysis Results

5.1 Results of Pooled Data Set

The empirical analysis for the current study starts with descriptive statistics and correlation analysis between variables. As shown in the <Table 1>, most of variables representing message characteristics were coded as dummy variables, and the

number of sample data is 403 observations. The correlation analysis did not present any serious problem on each variable that can affect the results of regression analysis. All the coefficient values were less than 0.5, which indicated that there was little possibility of multi-collinearity problem.

For the first round of analysis, pooled dataset that contains all variables defined in the study was analyzed. Main independent variables were used in the same model with different variable combinations to understand the role of each variable in the different situations. It is hypothesized that Hyperlink, Follower, Date information, RT Request, Sentiment, Originator, Spec description, Product Type, and Release Date would have an impact, and in order to figure out the degree of impact, the study carried out a regression analysis. <Table 2> indicates the results of the pooled dataset analysis.

The coefficient of Hyperlink turned out to be statistically significant on RT, the result shows opposite direction against the hypothesis. The coefficient value of -0.457 indicates that the more hyperlinks are inserted on Twitter messages, the less RT are appeared with 45.7% of possibility. Thus, Hypothesis 1a is not supported. The coefficients, Follower, Date information, and RT request were found to be positive and statistically significant. The coefficient values for the dependent variable are 12.7%, 29.6%, and 108.8% respectively. Thus, Hypothesis 1b, 3, and 5 are well supported. Although negative sentiment of message was hypothesized to have significant effect on RT, the result on the variable showed that positive sentiment had significant and posi-

tive impact on RT with coefficient value of 23.1% at 10% level. Thus, Hypothesis 2 is not supported. The result of originator shows that the impact of originator on the number of RTs can be different depending on who originally sent the message, specifically firm account or non-firm account. The coefficient of originator of business was found to be positive and statistically significant at 1% level, indicating that messages from business account are more prone to be disseminated than those from non-business account. Thus, Hypothesis 4 is supported. Spec description, which is related to information vividness, turned out to be statistically significant, but the result showed negative coefficient. It was expected that the variable would have positive relationship with RT number due to information vividness. However the result was definitely opposite, and thus Hypothesis 1c is not supported. The coefficient of product type was found to be insignificant, indicating that Hypothesis 6 is not supported. Finally the coefficient of release date turned out to be negative and significant, which indicates that there are more RTs before release date. Thus, hypothesis 7 is supported.

5.2 Results for Split Analysis with Contextual Factors

5.2.1 IT and Non-IT Product Types

Even though there was no statistically significant difference in terms of product type on pooled dataset, the study additionally conducted analysis by dividing sample dataset into two

<Table 1> Descriptive Statistics of Pooled Data Set

Variables	N	Mean	StdDev	Min.	Max.
RT_Numbe(log)	403	1.97	1.21	0	4.91
Hyperlink	403	0.86	0.35	0	1
Follower(log)	403	9.09	1.62	2.08	12.29
Date_Info	403	0.26	0.44	0	1
RT_Request	403	0.22	0.42	0	1
Sent_Pos	403	0.25	0.43	0	1
Sent_Neg	403	0.04	0.19	0	1
Originator_Biz	403	0.46	0.50	0	1
Spec_Descrpt	403	0.31	0.46	0	1
Product_Type	403	0.50	0.50	0	1
Release_Date	403	0.67	0.47	0	1

<Table 2> Results of Regression Analysis : Pooled Data Set

	1	2	3	4
Hyperlink	-0.495*** [-3.315]	-0.497*** [-3.303]	-0.456*** [-3.038]	-0.457*** [-3.025]
Follower(log)	0.125*** [3.810]	0.124*** [3.770]	0.128*** [3.910]	0.127*** [3.871]
Date_Info	0.363*** [3.084]	0.362*** [3.053]	0.297** [2.437]	0.296** [2.415]
RT_Request	1.032*** [7.372]	1.035*** [7.277]	1.086*** [7.640]	1.088*** [7.543]
Sent_Pos	0.235* [1.875]	0.236* [1.877]	0.230* [1.844]	0.231* [1.844]
Sent_Neg	-0.084 [-0.306]	-0.083 [-0.300]	-0.040 [-0.144]	-0.039 [-0.140]
Origin_Biz	0.325*** [2.781]	0.327*** [2.773]	0.337*** [2.897]	0.339*** [2.885]
Spec_Descrpt	-0.327*** [-2.786]	-0.326*** [-2.759]	-0.311*** [-2.655]	-0.310*** [-2.632]
Product_Type		0.014 [0.126]		0.011 [0.102]
Release_Date			-0.235** [-1.982]	-0.234** [-1.978]
Constant	0.834 [2.573]	0.831 [2.554]	0.926 [2.840]	0.924 [2.821]
Observations	403	403	403	403
R-squared	0.278	0.278	0.285	0.285

Note) Dependent Variable : RT_Number(log), * $P > 0.1$, ** $P > 0.05$, *** $P > 0.01$, t-value in parenthesis.

groups; one is IT products, and the other is non-IT products. The analysis intended to retest Hypothesis 6 in more details by discovering differences of empirical results between IT and non-IT products. In this second round of analysis, any serious correlation problem on each variable was not found. All the coefficients value was less than 0.5, which means that there was little possibility to the multi-collinearity problem. The size of sub-sample for IT data set and non-IT set is 203 and 200 respectively.

The estimation results for each analysis for different models appear in <Table 3>. It was found that the results were different in Hyperlink, Date information, Sentiment, Spec description,

and Release date. For Hyperlink, while IT dataset was not statistically significant, non-IT dataset was found to have negative relationship with RT numbers, which was consistent with the result of the pooled dataset. For Date information and Sentiment, only IT-related dataset turned out to hold positive effects on RT number. While non-IT data had negative relationship with RT numbers in terms of Spec description, IT dataset did not show statistically significant result on the relationship between Spec description and the number of RT. Release date was found to negatively influence on RT numbers in IT dataset. The result indicates that there are more RTs before the actual release for IT products.

<Table 3> Results of Regression Analysis : IT Products and Non-IT Products

	IT Products		Non-IT Products	
	1	2	3	4
Hyperlink	-0.249 [-1.005]	-0.182 [-0.753]	-0.593*** [-3.030]	-0.604*** [-3.033]
Follower(log)	0.106** [2.452]	0.125*** [2.924]	0.141*** [2.786]	0.142*** [2.793]
Date_Info	0.585*** [3.831]	0.454*** [2.939]	0.151 [0.795]	0.169 [0.851]
RT_Request	1.169*** [4.765]	1.299*** [5.347]	0.999*** [5.499]	0.988*** [5.315]
Sent_Pos	0.420** [2.257]	0.380** [2.090]	0.162 [0.910]	0.160 [0.895]
Sent_Neg	0.001 [0.003]	0.129 [0.319]	-0.168 [-0.441]	-0.176 [-0.460]
Origin_Biz	0.302* [1.791]	0.322* [1.951]	0.348** [2.052]	0.344** [2.018]
Spec_Descrpt	-0.211 [-1.282]	-0.159 [-0.987]	-0.399** [-2.322]	-0.401** [-2.323]
Release_Date		-0.486*** [-3.235]		0.060 [0.317]
Constant	0.637 [1.398]	0.720 [1.617]	0.859 [1.784]	0.820 [1.648]
Observations	203	203	200	200
R-squared	0.279	0.316	0.284	0.285

Note) Dependent Variable : RT_Number(log), * $P > 0.1$, ** $P > 0.05$, *** $P > 0.01$, t-value in parenthesis.

5.2.2 Release Date

For the last round of analysis, the study divided the sample dataset into two groups using another contextual factor; one is the group with pre-release period messages of new products, and the other is the group with post-release period messages. The analysis aims to figure out the differences of empirical results in terms of release date of a message. All the correlation coefficient values are less than 0.5, indicating little possibility of multi-collinearity issue. There were 131 data points for ‘before release’ category and 272 data points for ‘after release’ category.

The estimation results for each analysis of different models appear in <Table 4>. It was found that the results were different in Sentiment, Spec description, and Product type. For Sentiment, only ‘after release’ dataset showed positive and significant effect of Sentiment on RT number. However, for ‘before release’ dataset, the effect turned out to be statistically insignificant. While ‘after release’ dataset presented negative effect of Spec description on RT numbers, ‘before release’ dataset did not show statistically significant effect of Spec description. For Product type, only ‘before release’ data set showed positive impact on RT number at 5% level.

<Table 4> Results of Regression Analysis : IT Products and Non-IT Products

	IT Products		Non-IT Products	
	1	2	3	4
Hyperlink	-0.532** [-2.238]	-0.637*** [-2.680]	-0.410** [-2.049]	-0.389* [-1.941]
Follower(log)	0.104** [1.999]	0.106** [2.061]	0.132*** [3.058]	0.143*** [3.274]
Date_Info	0.328* [1.749]	0.319* [1.732]	0.314* [1.892]	0.345** [2.065]
RT_Request	1.324*** [3.903]	1.451*** [4.298]	1.038*** [6.533]	0.998*** [6.199]
Sent_Pos	-0.020 [-0.093]	-0.10 [-0.047]	0.357** [2.292]	0.328** [2.097]
Sent_Neg	-0.826 [-1.081]	-0.717 [-0.954]	0.125 [0.419]	0.108 [0.363]
Origin_Biz	0.312 [1.514]	0.361* [1.774]	0.331** [2.293]	0.307** [2.111]
Spec_Descrpt	-0.164 [-0.760]	-0.086 [-0.402]	-0.396*** [-2.797]	-0.408*** [-2.878]
Product_Type		0.447** [2.340]		-0.192 [-1.415]
Constant	1.206 [2.334]	0.975 [1.885]	0.617 [1.428]	0.613 [1.423]
Observations	131	131	272	272
R-squared	0.247	0.279	0.311	0.316

Note) Dependent Variable : RT_Number(log), * $P > 0.1$, ** $P > 0.05$, *** $P > 0.01$, t-value in parenthesis.

6. Discussion

6.1 Information Vividness

The study utilized three different variables to see the impact of information vividness on RT numbers; Hyperlink, Date information, and Spec description. While we theoretically expected these three variables would have positive impact on RT numbers, only Date information was found to have positive impact on RT numbers, but the others showed the opposite results. For explaining the reasons why these mixed results were presented, it is required to understand information usability and relevance that are related to information vividness.

The usability of WOM is defined as the degree of belief that the information of WOM can be helpful to make purchase-related decision-making (Davis, 1989). Thus, in the position of the information recipient, if the information is taken to be highly useful, the acceptance and efforts to spread this information through WOM increases (Kim and Kim, 2010).

Relevance refers to how much information corresponds to one's purpose and needs. Consumers go through a process of choosing the information by assessing how much it corresponds to one's goals and needs. According to Shelby (1998), consumers go through a process of assessing, choosing, and accepting information received through communication by looking at how much it corresponds to one's needs and how much one can comprehend it. Consequently, information that accurately corresponds to

the recipient's goals would make the recipient perceive that information as highly useful in making decisions and buying the product.

One of the factors that make the release of a new product important is the date information. In the case of the iPhone, the schedule for new models or updates makes consumers more interested in the brand, and rumors and articles related to the schedule are rampantly published in the media. Information vividness, which we have looked at while establishing the hypothesis, contains date information. Date information is detailed information related to the product launch so it gives credibility to the consumers regarding the message and in turn, increases its impact. This detailed information is classified to be highly useful to the consumers. This is because the consumers find it important to know when to buy the products or services.

In the messages of Twitter, originators use shortened URL due to the limitation of 140 characters. By seeing this shortened URL, any followers cannot find or guess that the URL is linked to which kinds of site, and guarantee the URL is related to the contents of the original message, which means that it looks like spam. It may increase the uncertainty of hidden pages. Therefore, followers may have a fear to click it.

Consumers today are not in need of information about a product's specification. Rather, they need information about first-hand experiences (Song, 2011). In other words, consumers find it difficult and repel complex looking specs and this makes them feel that such information

is not relevant in the purchase of the product. Thus they do not read them or try to convey the information. Instead, consumers are apt to think what kinds of usage experiences will be provided, and thus it can be expected that messages which describe subjective or objective usage experiences will have more RT.

6.2 Messages

The empirical results related with ‘Message’ variable differ from the hypotheses. The increase in the number of RTs upon the request to spread RT can be explained by the following reasons (Dichter, 1966); (1) Showing connoisseurship : talking about certain products can serve as proof of being “in the know” (2) Feeling like a pioneer: newness and “difference” of products provide the speaker with an opportunity to identify with them and their makers (3) Asserting superiority : recommendation of products can be used as a tool for assuming leadership and exercising power over the listener.

Overall, the follower who got the request for RT gets the feeling that he or she knows the product to be launched well. And for the products to be newly released, the follower gets the feeling of relative superiority by having the power of providing information to others and exercising leadership through such acts. For this reason, they react positively to the RT requests. That is, even though the follower has to propagate commercial messages, these psychological factors induce the follower to retweet the originator’s message, or to retweet another follower of the originator.

Inconsistent to the Hypothesis 2, the results show that sentiments have statistically meaningful difference. There is difference between positive and negative sentiments of the messages affecting on RTs. The reason is derived the characteristics of Twitter itself. If the sentiment would be negative in Twitter messages, it is quite difficult for followers to find useful information about newly released products. It means that negative sentiments do not have information vividness, and thus, RT number is not high.

In addition, even though normally negativity bias exists, it may not be applied in product related messages. It means that users are more likely to spread the positive messages in terms of products, different from the fact that negative stories or events not related to product or service are fast and widely diffused.

6.3 Characteristics of Originator

In the cases where the sender of the message was the originator, there were more RTs. We can explain this by the differences between the credibility of the source of information in the cases where the originator was a company and where it was not. Normally, messages sent out by companies have commercial intent so consumers see them as noise or tend to repel them. However, in terms of tweet, there is a less repulsion to the message sent out by companies. This is due to the tweet’s characteristics of limiting the length of a tweet to 140 words. By limiting the tweet messages to 140 words, the companies focus on providing basic information about

the product in order to make the consumers aware of its launch rather than persuading them to buy the product.

6.4 Product Type

Through the analysis of pooled data set, we could not find any differences between IT and Non-IT data sets. However, we divided the whole data set into two groups and found several differences in hyperlink, date information, sentiment, spec description, and release date.

In the case of non-IT products, date information is statistically insignificant. While important for IT-products, date information may not be important for non-IT products. When consumers buy IT-products, they consider the time they purchase since they are apt to be on the cutting edge of fashion through their purchasing behavior of IT products. That is because IT products have very faster Product Life Cycle (PLC). On the other hand, when we purchase non-IT products such as foods, cosmetics, and so forth, we are not feeling to consider the date information. Consumers just think whether the products are launched or to be released, and if products are on the markets, they just try to buy them. In addition, for hyperlink and spec description, only non-IT data set showed negative impact on RT numbers. There is higher possibility that consumers interested in Non-IT products or services in Twitter are the elderly. They are relatively less familiar to the usage of IT devices or services and pay little attention to the specification of the products or services than younger persons. Thus,

we can see these empirical results. For non-IT data set, the sentiment of messages is not statistically significant on RT number. This is because it is relatively difficult to find the sentiment on non-IT related messages in Twitter. For release date, only IT-related data set has negative impact on RT numbers. This is because latent users for IT products or services have higher attention to new products or services before release dates. Additionally, latent users for non-IT products or services have less sensitive to the release time. It is coming from the characteristics of product type.

6.5 Release Date

When we analyzed by release date, we found that there are differences in sentiment, spec description, and product type. For sentiment, if the sentiment 'after release' is positive, it may have higher credibility, because this sentiment is derived from the direct or indirect usages. For example, a consumer thinks that a new product will not provide better utility than previous one before he or she experience to use it. However, after purchasing it or experiencing it in the offline channels, the opinion can be changed from negative to positive. It can provide followers with credibility. Therefore, the empirical result about sentiment can be different depending on release date.

The reason why spec description has negative impact on RT numbers after release is that the need for spec of newly released products or services are decreased after release date. That is because spec description is helpful for consumers to indirectly experience the products or services,

and after release, consumers can directly experience them.

For ‘before release’ data set, product type have positive impact on RT numbers. Since we coded IT data set as 1, and Non-IT data set as 0, the result means that IT products or services have more impact on RT numbers before actual release. That is because latent users have more attention, discussed and shared a lot of their opinions about newly released ones, which brings more RTs.

7. Conclusion

By investigating WOM effects in Twitter, the study seeks to understand the role of online social network services in promoting product sales. Through the empirical analysis of more than 400 real Twitter messages in terms of message characteristics, the results provide some implications applicable to marketing communications with consumers over today’s online social network.

First, firms should increase information vividness in the messages sent in accordance with product types. According to this study, vivid information such as date information should be an essential element in a message in order to make people trust the message. Hence, continuously sending tweet messages related to the launch dates would prove to be useful. For example, in the case of iPhone or Galaxy, even though there was a lack of a confirmed launch date, the approximate dates have been constantly circulated in the form of rumors. The interest and perception of the consum-

ers regarding the product could be maintained through these methods and the launch of the product when a certain level of critical mass is reached would boost the sales of the product. Firms can make full use of such strategies. Also, rather than providing information such as hyperlink or specs of the product which are more useful to the firm, there is a need to provide information that consumers truly need in purchasing products. For example, by pointing out the shortfalls of the rival products and showing how the firm’s product is an improved version, or what can be experienced when using the products, or short reviews. These vivid first-hand reviews that allow the latent consumers to have an indirect experience of the products should be provided. In addition, other than date information or user experiences, firms should look for information that can increase information vividness. This can differ according to the characteristics of the products. In the case of IT devices, this can be date information, but for food products, factors such as taste or price can provide a more detailed and vivid information. The different characteristic should be carefully considered and information related to the product should be provided.

Second, firms should request RTs when they send messages related to ‘launched’ or ‘to be released’ through Twitter or other social network channels. According to the statistics of Bloter.net, average number of RTs is 2.2, and approximately 0.6% of all RTs can be retweeted over five times. Considering these tremendously few RTs, when RTs are requested and then the numbers of RTs are increased, it will be helpful for firms to request

RTs to followers. It will enhance the perception of new products, and thus, secure potential buyers. Therefore, firms need to request RTs with linking to events within no stirring consumers' emotion.

Finally, the usage of business account in order for several customer services would be valuable in Twitter or other SNS channels. Source credibility can influence responses to a message, because it reduces the uncertainty of the consumers through emphasizing reliability and reducing threat to perceive. (Granovetter 1993; Godes and Mayzlin 2004; Chan et al., 2006) The results of this study show that the credibility of firm-managed Twitters is higher than other accounts. Thus, firms can use their accounts to spread information including new products released. The strategy can provide better promotion effects that more consumers perceive and spread the information of new products.

Our findings suggest that in the world of online WOM and sales, we may need a more concrete and specific understanding of how the consumers react to the message of new products newly launched to the markets when they use social network services. This study found that specific information such as the date of launched or to be released enhances information vividness and can spread the messages more. However, several factors such as hyperlink, spec descriptions have less usability and relevance of information which will bring less influence to consumers. In addition, it has better effects when originator requests RTs, is a firm, and has more followers. These results mean that consumers in social network sites not just absorb information but judge it by several standards. Thus,

firms need to understand and use it as business knowledge for better marketing performance.

One limitation of the current study is that it cannot provide how fast RTs arrive in followers, 'velocity' of RTs. It is because SocialMetrics.com, the data source of this study, provides only the secondary data with limitations. If it provides raw data for RT, which has the information of users' IDs, sending and receiving time, we can investigate how fast word-of-mouth is diffused. The studies of WOM or the velocity of message diffusion have a quite important research purpose. Although important to have a lot of RTs, it is much more important for firms to know how fast messages are approached to consumers. The information about new products released should be spread in proper timing, because proportion effects that firms aim to can be expected to work, and thus it is possible to sell the products as much as they desire. Thus, investigating the velocity of WOM is expected to be a possible future research subject.

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Abstract

신제품 프로모션에 대한 온라인 소셜네트워크의 구전효과 분석 : 트위터의 정보전달과정을 중심으로

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인터넷으로 대표되는 정보기술의 발전은 우리의 일상생활과 기업활동에 많은 영향을 미쳐 왔다. 아울러 최근에는 온라인 소셜네트워크라는 새로운 인터넷 커뮤니케이션 채널의 등장과 확산으로 인해 이용자들은 시간과 공간적인 제약 없이 전세계적인 의사소통을 할 수 있게 되었고 우리사회는 또 다른 패러다임의 변화를 맞이하고 있다. 이들 소셜네트워크 중 트위터는 가장 빠른 성장세를 보이는 온라인 매체 중 하나로 사용자는 140 단어 이내의 비교적 간단한 문장을 온라인 상에 게시하고 (Tweet) 다른 사용자들이 게시한 메시지를 다시 게시할 (Retweet) 수도 있다. 트위터의 이러한 Tweet/Retweet 기능은 새로운 온라인 정보확산 매커니즘의 예를 보여주며 상호 의사소통의 속도와 범위에 영향을 주고 있다. 비즈니스 관점에서의 트위터의 확산은 온라인 소셜네트워크를 제품 프로모션을 위한 새로운 마케팅 커뮤니케이션의 도구로 활용할 수 있는 기회를 제공하고 있다. 본 연구는 마케팅 전략적 관점에서 트위터의 잠재성을 이해하는 목적에서 트위터 상의 정보전달체계 중심으로 신제품 프로모션에 대한 온라인 소셜네트워크의 구전효과를 분석 하였다. 이를 위해 특정 신제품과 관련하여 2011년 6월부터 9월 사이에 게재된 트위터 메시지를 수집하여 트위터 메시지가 제공하는 정보의 충실도, 메시지 특성, 메시지 게재자의 성격등과 같은 변수와 온라인 소셜네트워크 상의 구전효과 (리트윗 횟수)와의 관계를 분석하였다. 분석결과 신제품 출시일자 정보, 제품사양, 리트윗 요청, 트윗 게시자 특성 등이 구전효과에 유의한 영향을 미치는 것으로 파악되었다. 아울러 제품의 특성과 트윗 메시지 게시일에 따라 구전효과에 미치는 영향이 달라짐을 발견하였다. 본 연구의 결과는 신제품 프로모션과 관련한 구전효과 발생에 있어 온라인 소셜네트워크의 영향에 관한 연구기반을 제공하며 기업이 새로운 제품에 대한 광고 및 마케팅 커뮤니케이션을 수행 함에 있어 온라인 소셜네트워크를 효과적으로 활용하는데 필요한 유용한 가이드를 제시 할 것으로 기대된다.

Keywords : 신제품 프로모션, 온라인 소셜네트워크, 리트윗, 트위터, 구전효과

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고려대학교 경영대학 경영학 학사 및 동 대학원 경영학 석사학위를 취득하였다. 관심분야는 Information diffusion on online social media, the impact of online social network service on marketing promotion이다.



손인수

현재 고려대학교 경영대학 대학원 박사과정 재학 중이다. 고려대학교 경제학사, University of Wisconsin-Madison 경영학 석사 (MBA), Carnegie-Mellon University 경영정보학 석사 (MISM)를 취득하였으며 LG-CNS 컨설팅 부문에서 근무하였다. 주요 관심분야는 E-business, Service-oriented computing, Technology-based innovation, Business value of IT, Consumer behaviors under social network environment이다.



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현재 고려대학교 경영대학 교수로 재직 중이다. 서울대학교에서 경영학사 및 경영학 석사, University of Arizona에서 MIS 석사, University of Minnesota에서 경영학 박사를 취득하였다. 주요 관심분야는 전자상거래 가격 전략, 온라인 소비자 행동 분석, 소셜미디어, 클라우드 컴퓨팅 등이다. Review of Economics and Statistics, Journal of AIS, Journal of MIS, International Journal of Electronic Commerce, Communications of the AIS, Information Systems Frontier, Electronic Markets, Journal of Global Information Technology Management, ACM Crossroads 등을 비롯한 다수의 국내외 학술지에 논문을 발표하였다.