How do we Tweet? The Comparative Analysis of Twitter Usage by Message Types, Devices, and Sources

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Abstract

Facing the growing importance of social media in the marketing field, this study is intended to build a better understanding of Twitter usage. A total of 73,192 tweets were examined by message types, devices and platforms used. Instead of relying on the audience's response (e.g., survey or experiment) or traditional content analysis, this study used a data-mining approach and software that are widely used in the computer science field. Overall findings indi-

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cate that individual users prefer mobile devices to desktops and use more official web pages or mobile applications provided by Twitter when they tweet, and their most popular message type was the Singleton, an undirected message with no specific recipient. However, we also found that tweets generated through business sources were different from those through official sources in terms of message type, devices, and the nature. The implications of these findings were discussed.

I n recent years, we have witnessed a phenomenal change in how we communicate, largely due to the explosion of social media and technologies. Diverse social media platforms, such as Facebook, YouTube, Instagram, Snapchat, and Twitter, have rapidly grown in size and influence. Particularly, Twitter has become one of the popular social media platforms since its inception in 2006, with over 313 million monthly users (Twitter, 2017). Recent Pew Research Center reported that Twitter users account for about 23% of all Internet users, and 63% of adults (ages between 18 and 49) use Twitter (Duggan, 2015). Since the first tweet was sent by Jack Dorsey (@jack) on March 21, 2006, the average number of tweets per day has increased from 300,000 in 2008 to 200 million in 2011 and to 500 million as of January 2017 (Omnicore, 2017). Traditionally, the flow of mass communication, particularly advertising, has been unidirectional, originating from businesses and organizations to inform, persuade, and remind current and potential customers of their product offerings and benefits. In this traditional model, consumers were passive receivers and simply reacted to such

messages by either ignoring or becoming attentive (Boyd & Ellison, 2007; Campbell, Pitt, Parent, & Berthon, 2011; Chu & Kim, 2011). However, technology and the Internet have revolutionized this traditional communication pattern and have transformed it into a more interactive process. Thus, consumers are more connected, informed, and empowered in this social media age.

Various industries, including the media and advertising industries, have made significant efforts to adapt to such swift changes and have paid attention to building competitive advantages using social media in the marketplace. Social media have become an important marketing venue for marketers, allowing them to reach a wide range of target audiences efficiently. Therefore, it is typical to see icons of Facebook and Twitter on many businesses' websites and advertising messages. Simultaneously, the same social media sites create serious challenges for the marketing world, since consumers are further fragmented by various media platforms and they can jeopardize brand equity and brand images by sharing their unpleasant or dissatisfied experiences with others through social media (Kaplan & Haenlein, 2010). Therefore, it became imperative for marketing and advertising professionals to better understand the complex behaviors and minds of consumers: Why do consumers choose to use Twitter, how do they use it, and what interactions do they have with other users? This study is intended to address these topics to build a better understanding of Twitter usage.

By using the "active audience concept," and relying on marketing literature, we chose a grounded theory approach and presented research questions for in-depth un-

derstanding of Twitter usage in order to detect any patterns that consumers might show.

The Audience's Media Use in the Media Convergence and Social Media Era

A common assumption held by social psychologists and technology adoption researchers is that few media can fulfill all of the goals audiences seek. Accordingly, the audiences select certain media based on their perceived functionality (Ferguson & Perse, 2000; Lin, 2006; Papacharissi & Rubin, 2000) and use several media at the same time. Recent industry reports indicate that consumers mix traditional and digital media at the same time, and TV and online media was the most popular combination. For example, eMarketers' survey conducted in December 2011 reported that people used TV for 3.4 hours and online media for 3.1 hours while the Interactive Advertising Bureau reported TV using time for 4.6 hours and Internet for 2.8 hours in 2012 (Miller & Washington, 2013). The most recent industry data, however, reported that TV consumption dominance over Internet was reversed in 2013 as people spent more time with digital media than watching TV, and projected that people will spend about 6 hours on digital media and about 4 hours on TV by 2017 (Advertising Age, 2016). Also, more than half of all media interactions involve multitasking, and about 77% of people use TV with another device. In particular, about 49% of media users use TV with a smartphone and about 35% use TV with a PC/laptop (Miller & Washington, 2013). These changing media consumption behaviors have made marketers and various organizations diversify the channels to reach their target audiences.

The Concept of Active Audience
and Uses and Gratifications

As an influential theory in media research, the uses and gratification (U&G) perspective assumes that different people can use the same medium for different purposes. The theory holds that multiple forms of media compete for users' attention and audiences select the medium that meets their needs, such as the desire for information, emotional connection, or status (Baran & Davis, 2011; Tan, 1985). At the core of this theory is the concept of an active audience, which assumes that the audience's communication behavior is goal-oriented and purposeful in that people choose certain media based on their needs, wants, or expectations.

U&G has recently been revitalized for studying technologies and media consumption behavior. This includes research on the web (Ko, Cho & Roberts, 2005; Roy, 2009), on blogging (Hollenbaugh, 2010; Kaye, 2007), and social networking sites, such as Facebook and Twitter (Chen, 2011; Muntinga, Moorman, & Smit, 2011). Researchers found that interactivity, recreation, entertainment, diversion, information involvement, connectedness, and personal relevance are all major motivating factors to browse or use the Internet and social media platforms. Particularly, Stafford, Stafford, and Schkade (2004) have identified that users seek three types of gratifications: content gratification (the content of the medium, whether it's entertainment or information), process gratification (the experience of the media usage itself, such as Internet surfing or experiencing a new technology), and social gratification (the interpersonal communication and social networking opportunities on the Internet). Shao (2009) further ar-

gues that individuals use online media at three different stages/levels for their own needs: (1) consuming content for information, entertainment, and mood management needs; (2) participating through interacting with the content, as well as with other users, for social connections; and (3) producing their own content for self-expression and self-actualization. In other words, online users have varying degrees of engagement with social media, ranging from simple and passive (e.g., simply consuming the content by reading) to active (e.g., producing and posting the content).

What Shao (2009) indicates in his study has relevant implications for the analysis of the different message types that people tweet. The first level — consuming content for information, entertainment, or mood management needs — indicates a simple, passive reading behavior of users. On the other hand, the second and the third levels involve more active roles of users from tweeting their own thoughts, emotions, and information to retweeting others' messages and further to replying to certain messages for a higher level of engagement and social interactions. Based on this implication, one of this study's objectives is to identify dominant or popular types of tweets that people use.

Social Media and Marketing

No one can dispute that social media have become a vital marketing tool in the twenty-first century, particularly among millennials. As consumers become active in expressing their opinions about brands through reviews, microblogs, pictures, and video blogs, marketers have made more conscious efforts to engage consumers in building relationships. One example is what Doritos has done over the past ten years by running consumer-generated

commercials contest for the Super Bowl games. Doritos was able to engage the consumers and increase the consumer loyalties (Schultz, 2016). Due to the importance of social media in marketing, particularly in relationship marketing, consumers as well as marketers acknowledged that social media should be part of overall brand communications. In 2009, 16% of the Fortune 500 companies had corporate blogs that link to a variety of social media channels, including podcasts, RSS feeds, and Twitter (Barnes & Mattson, 2009). In 2013, 86% of marketers believe social media is an important channel for their marketing initiatives (Stelzner, 2013). Also, about 93% of consumers indicated that a company should have a presence in social media while 85% indicated that a company should seek active interactions with customers through these platforms (Cone Business, 2008). Such recognition of the importance of social media as a marketing tool was reflected in their increased social media spend. Total spending on social media advertising has increased by 56.2% from $11.36 billion in 2013 to $17.74 billion in 2014 (eMarketer, 2015).

Among the growing number of studies on social media and marketing, some literature has focused on consumers' responses to consumer-generated ads (CGAs), or user-generated content (UGC) and examined whether they differ from firm-generated ads (FGAs) or firm-generated content (FGC) (Homburg, Ehm & Artz, 2015; Kumar, Bezawada, Rishika, Janakiraman, & Kannan, 2016; Pehlivan, Sarican, & Berthon, 2011). Pehlivan et al. (2011) analyzed consumers' comments left for CGAs and FGAs for the MacBook Air, and found that the nature of comments for each type of ads was different as comments for CGAs were more focused on humor while comments for

FGAs were referenced to the major features, such as the song used in the ads. Another study in a similar topic examined the effects of FGC in social media and found that FGC not only enhance the transaction and relationship sides of customer-firm interactions but also play a role in increasing profitability (Kumar et al., 2016). These researchers also found that FGC became more effective when used simultaneously with other communication channels, such as TV and email. These studies guided another research question for this study and led us to examine the sources of tweets, whether they were generated by individual personal consumers (similar to the concept of user-generated content or consumer-generated ads) or by commercial business-oriented sources (similar to the concept of firm-generated ads or content). As Twitter becomes a more vital marketing tool, many companies and websites have recently provided Twitter-based advertising services and business solutions. Those companies, such as Unfollowers, TweetDeck and TweetAdder, tend to generate tweets automatically to enhance certain brands' performances in the marketplace. Considering this growing trend in the Twitter industry, we also would like to see how strong these activities are.

Guided by the multitasking media consumption patterns, this study is also interested in understanding how people send out their messages — which devices and platforms they use. The fast growing technological developments provide many options for people, and we are interested in answering how they selectively use certain outlets over all other alternatives. Another area that we seek to answer in this study is the level of activity among Twitter users: whether or not people who post messages on

Twitter are just posting their thoughts and emotions or actually interacting with other people. Desire to maintain social interaction has been identified as one of major motivations for media consumption (Joinson, 2008; Papacharissi & Rubin, 2000). At the same time, literature on Twitter use reports that the interactivity among Twitter users tend to be lower than expected (Wohn & Na, 2011). Therefore, the following research questions have been addressed in this study:

>**RQ1:** What types of messages are mostly exchanged on Twitter? How engaged are people through Twitter conversation?
>**RQ2:** How do Twitter users post tweets? What kinds of devices and platforms do they prefer using?
>**RQ3:** How pervasive are tweets from business/profit-oriented sources in the Twitter world, compared to those from individual consumers? How different are these tweets in terms of devices and message types?

Methods

Instead of using a traditional content analysis, this study used data-mining techniques to collect and comprehend massive amounts of tweets exchanged, such as the frequency and amount of traffic generated, types of tweets, the devices used to post tweets, and the nature of tweets exchanged for a certain brand or commercial.

As survey, experiment, and content-analysis methods are conventional research methods in the mass communication field, the data-mining techniques are well-adopted in the computer science field and allow research-

ers to handle a huge amount of data and discover knowledge and information from them (Byun, Lee, & Kim, 2012; King, Li, & Chan, 2009; Lee, Han, Kim, & Kim, 2014). As the amount of tweets exchanged in cyberspace is enormous, it is not possible to retrieve, filter, analyze, and visualize them without automated-tools and well-defined approaches. For this reason, all tweets exchanged in the study period and user profiles were collected through an automated Twitter data collecting tool, which was developed from previous studies (Byun et al., 2012; Lee et al., 2014).

Among numerous tweets, we decided to examine the tweets about Super Bowl games and advertising, mainly because the Super Bowl game was one of the five most-watched broadcasts in 2012 (with 111.3 million viewers) and became the most watched TV program in U.S. television history in 2014, reaching 112.2 million viewers (Steinberg, 2012; O'Connell, 2014). With the average cost of $4 million for a 30-second spot, the Super Bowl remains a major advertising venue due to its ability to draw such a large audience and create buzz about the commercials and brands. With the popularity of Twitter, the Super Bowl becomes an important venue for generating active tweets and communicating with consumers. For example, in 2011, the Super Bowl was ranked the third highest TV event in terms of a social-TV total activity score, right after England's Royal Wedding and the MTV Video Music Awards (Dumenco, 2011). Here, the social-TV total activity score measures social media activity related to major TV programs on Twitter, Facebook profiles, and the social applications, such as GetGlue and Viggle (Eversley, 2013). Particularly, Super Bowl XLVI in 2012 was marked as the

first attempt at converging social media and television broadcasting that successfully drew viewers' interests. During the 2014 Super Bowl game, some marketers such as Pepsi, Samsung, and Oreo, formed a "mission control" center or a "war room" at their companies to monitor Twitter messages and to interact with their audiences (Learnonth, 2013). All of these suggest that the Super Bowl is a relevant venue to draw tweet messages for the analysis.

The study period was the three weeks surrounding the Super Bowl game in 2012, 2013, and 2014: one week before and two weeks after the Super Bowl (Jan. 29, 2012 to Feb. 19, 2012; Jan. 27, 2013 to Feb. 17, 2013; Jan. 26, 2014 to Feb. 16, 2014). This study period was chosen to include all tweets related to the topic since marketers released their ads on social media sites like YouTube prior to the actual broadcast of the game in hopes of creating more buzz, and Twitter traffic is typically higher than average for a few weeks after the game, as the lingering impact of the advertising continues (Adobe Digital Index, 2014).

This study analyzed two sets of data: "General Data" and "Sample Data." "General Data" included all tweets exchanged during the study period (Jan. 29, 2012 to Feb. 19, 2012; Jan. 27, 2013 to Feb. 17, 2013; Jan. 26, 2014 to Feb. 16, 2014). Out of this data set, a "Sample Data" set consisted of Super Bowl commercial related tweets. Tweets about Super Bowl commercials were retrieved from this "general data" set by using key words, such as "Super Bowl," "Super Bowl commercials," "ads," and any company/brand name or commercial titles that were broadcasted on each of three Super Bowl games. For example, key words such as "Pepsi," "Soundcheck," "Bud

Light," "Epic Night," "Jeep," "Restlessness," "Hyundai," "Sixth sense," "H&M," "David Beckham," and "NFL" were used. The unit of analysis was every single tweet identified by the aforementioned search terms within the study period. Overall, we retrieved 73,192 tweets (35,187 in 2012, 34,350 in 2013, and 3,655 in 2014) related to the Super Bowl commercials.

Following the typology suggested in previous studies (Kwak, Lee, Park, & Moon, 2010; Larsson, 2013), each tweet in the data set was classified into three categories: Singleton, Retweet, and Reply. A Singleton is classified as an undirected message, where no specific recipient is suggested. So when a user posts a tweet without referring to other users or tweets, we classified it as a Singleton. When a user sends a tweet by reposting someone else's tweet, it is called a Retweet and is marked by the prefix "RT." All tweets with RT were classified as a Retweet. When a user posts a tweet by referring to another user with an @ sign, it is considered a Reply. A Reply message is different from other categories in that it sends a tweet to a designated person. All messages with an @ sign were classified as a Reply. Thus, among these three types, a Reply is considered a higher-level engagement between users than the other two, while a Retweet is considered a lower-level message exchange between users in that a user simply reproduces a tweet written by another user without further adding his/her own messages. For that reason, we examined the percentages of a Retweet and Reply in the data "sample" to analyze the degree of the message exchanges between users. The higher percentages of Reply would indicate that message exchanges and engagement were made at a higher level among Twitter users while the

Table 1

Example of URL sources and tweet counts

Source	URL	Tweet count
Twitter for iPhone	http://twitter.com/download/iphone	569,018
Twitter for Android	http://twitter.com/download/android	352,537
Twitter Official Web	http://twitter.com	311,690
Twitter for BlackBerry	http://blackberry.com/twitter	74,061
Twitter for iPad	http://twitter.com/#!/download/ipad	53,637

higher percentages of a Retweet or Singleton indicate a lower-level exchange.

Twitter provides the name of the platform which contains specific uniform resource locator (URL) information, showing how each tweet was posted. Three graduate students analyzed all URLs used to tweet and found that about 99.8% of all tweets were generated from 600 URLs. These identified 600 URLs were used for source analysis, and their examples are listed in Table 1.

To address the second research question, each tweet was coded by the medium used to post: mobile and desktop. Here, a tablet was included as mobile. Then, a mobile device is further classified into three categories since Twitter users have three options to tweet from their mobile devices: as Twitter official sources (Twitter mobile applications and Twitter official mobile web site), business sources (business and profit-oriented sources), and miscellaneous (other mobile applications, 3rd party web site, or unknown sources). In the same way, the tweets posted through the desktop computer were further classified into three categories: as Twitter official sources (Twitter official

Table 2

Categories of Tweet Sources for Coding

Device	Source	Example
Mobile	Twitter Official	- Twitter for iPhone, - Twitter for iPad - mobile.twitter.com
	Business	- TwitRocker2 - Tweetro+
	Miscellaneous	- Instagram
Desktop	Twitter Official	- Twitter Official Web
	Business	- Unfollowers.me
	Miscellaneous	- Facebook

desktop web site), business sources (business and profit oriented sources), and miscellaneous (other mobile applications, 3rd party web site, or unknown sources). Table 2 summarizes the categories used to analyze the device and platform preference in posting tweets. Here, a business source means a website domain that is owned by private companies to provide Twitter-related advertising business or Twitter analysis services. These business sources are profit-oriented sites that support marketing efforts for various companies and organizations by contracts. Table 3 shows profiles of the Top 10 official and Top 10 business sources.

Results

A total of 1,413,524 tweets in 2012, 2,079,902 tweets in 2013 and 1,852,181 in 2014 were retrieved during the study period. Out of these ("General Data" of 5,345,607 tweets), a total of 73,192 Super Bowl related tweets (called "Sample Data") were analyzed (i.e., a total of

Table 3

Profiles of the Top 10 Official Sources

Name	URL	Type
Twitter for iPhone	http://twitter.com/download/	Mobile
Twitter for Android	http://twitter.com/download/	Mobile
Twitter Official Web	http://twitter.com	Company
Twitter for BlackBerry	http://blackberry.com/twitter	Mobile
Twitter for iPad	http://twitter.com/#!/download/	Mobile
Twitter for Android	https://twitter.com/download/	Mobile
Tweet Button	http://twitter.com/tweetbutton	Application
Mobile Web (M2)	https://mobile.twitter.com	Mobile
Twitter for Windows Phone	http://www.twitter.com	Mobile
Mobile Web (M5)	https://mobile.twitter.com	Mobile

35,187 tweets in 2012, 34,350 in 2013, and 3,655 in 2014). Over these three years, the total number of Super Bowl related tweets was the lowest in 2014, and the portion of Super Bowl commercial related tweets out of total tweets significantly decreased to 0.2% in 2014, compared to 2.5% in 2012 and 1.7% in 2013. It seems that there were fewer messages and conversations on Twitter about Super Bowl commercials in 2014, compared to the two previous years (See Table 4).

The first research question asked what types of messages were mostly exchanged on Twitter. Over the past three years from 2012 to 2014, a Singleton is the most popular message type (accounting for 37-42%), but all three types show relatively similar portions. The year of 2014 had a lower portion of Reply (accounting for 17.8%),

Table 4

Data "General Data" and "Sample Data" by Year (2012-2014)

	2012	2013	2014	Total
No. of "General Data" (All tweets)	1,413,524	2,079,902	1,852,181	5,345,607
No. of "Sample Data" (Super Bowl commercial related tweets)	35,187 (2.5%)	34,350 (1.7%)	3,655 (0.2%)	73,192

Table 5

Type of Messages by Year (2012-2014) in "General Data"

	2012	**2013**	**2014**
Singleton	534,990 (37.8%)	763,470 (36.7%)	778,726 (42%)
Retweet (RT)	423,138 (29.9%)	727,717 (35%)	743,926 (40.2%)
Reply (@)	455,396 (32.2%)	588,715 (28.3%)	329,529 (17.8%)
Total	1,413,524	2,079,902	1,852,181

compared to the two previous years (32.2% in 2012 and 28.3% in 2013) (See Table 5). However, when we examined the tweets related to Super Bowl commercials, we see a much wider differences among the three different message types. Singleton messages accounted for a larger portion (about 60%-72%), followed by Retweet (17%- 35%), and Reply (6%-13%).

Even if each year showed a different portion of each message type, the overall pattern was consistent. The percentages of Retweet consistently increased from 2012 to 2014, while the portion of Reply tweets has significantly

Table 6
Type of Messages by Year (2012-2014) in "Sample Data"
(Super Bowl commercial related tweets)

	2012	2013	2014
Singleton	24,971 (71.0%)	22,733 (66.2%)	2,293 (60.3%)
Retweet (RT)	5,850 (16.6%)	7,899 (23%)	1,253 (34.3%)
Reply (@)	4,366 (12.4%)	3,718 (10.8%)	200 (5.5%)
Total	35,187	34,350	3,655

decreased. In 2012 and 2013, Reply tweets accounted for 12.4% and 10.8% of all tweets, respectively (See Table 6). However, it was drastically decreased to 5.5% in 2014. These differences were statistically significant (χ^2=766.01, df = 4, p <.0001). This finding suggests that people used three different types of messages almost evenly as they tweeted general messages, but when they tweeted about Super Bowl commercials, they mostly used a Singleton type by posting undirected messages without much interactions with other users.

The second research question intended to find tweeting methods, how users post tweets and the device/ platform that they use. As Table 7 shows, Twitter users preferred mobile devices (1,218,594 tweets, 65.9%) to desktop computers (629,160 tweets, 34.1%) as they tweeted general messages. Even if there are more sources for Twitter posting on desktop computers (469 sources, 78.2%) than in mobile devices (131 sources, 21.8%), two thirds of all tweets were generated via mobile devices. This means that the majority of people prefer the mobile device to post general tweets. When we examined the Super Bowl related tweets (i.e., "Sample Data"), however, we found a dif-

ferent pattern. A desktop was used for posting 67.8% of Super Bowl related tweets (2,399 tweets) while a mobile device was for posting 32.2% of Super Bowl tweets (1,139 tweets). This was an unexpected finding, but as we examined this data with the sources, this unexpected finding was understood. It might be due to the fact that 85% of tweets posted through mobile devices came from official sources (966 tweets out of 1,139 tweets), while none of tweets came from business sources. On the other hand, only 46% of tweets posted through desktop devices came from official sources (1,095 tweets out of 2,399 tweets) and the remaining portion of tweets through desktop devices (54%, 1,304 tweets out of 2,399) was from business profit-oriented sources or miscellaneous sources. Also, all Super Bowl related tweets generated from business sources were posted through desktop devices (all 578 tweets). In other words, all business profit-oriented sources pushed Super Bowl related tweets through desktop devices, which might have contributed to a higher number of desktop device data. This complicated data was further analyzed and discussed in a later section.

Once a device was identified, we examined the sources that generated tweets. The sources were categorized as Twitter official sources, business sources or miscellaneous sources (Table 2). Among all identified 600 URLs as Twitter posting sources, 32 URLs were Twitter official sources, 90 URLs were business sources, and 478 URLs were miscellaneous sources. Even if Twitter official sources were smaller, most tweets were generated from Twitter official sources (1,501,015 out of 1,847,865 general tweet messages and 2,061 out of 3,538 Super Bowl related tweets). This means that even though there are many ap-

Table 7
No. of Tweets Generated through Devices and Sources (2014)

	Mobile				Desktop				Total
	Official	Business	Misc.	Total	Official	Business	Misc.	Total	
No. of sources	14	2	115	131 (21.8%)	18	88	363	469 (78.2 %)	600
No. of "General Data" (All tweets)	1,157,016	133	61,445	1,218,594 (65.9%)	343,999	120,665	164,607	629,271 (34.1%)	1,847,865
No. of "Sample Data" (Super Bowl commercial related tweets)	966	0	173	1,139 (32.2%)	1,095	578	726	2,399 (67.8%)	3,538

Table 8

Type of Tweets Generated through Twitter Official and Business Sources from "Sample Data"

	Official Sources	Business Sources
Singleton	780 (37.8%)	513 (88.8%)
Reply	182 (8.8%)	4 (0.7%)
Retweet	1,099 (53.3%)	61 (10.5%)
The number of "Sample Data" (Super Bowl commercial related tweets)	2,061	578

plications or web pages where Twitter functionalities are integrated, the majority of people prefer to post tweets through the Twitter official sources.

Also, among all identified 90 business sources, 88 URLs and 99.9% of general tweets (120,665 tweet out of 120,798 tweets) came through desktop business sources, and only 133 tweets (0.1%) were generated through mobile business sources (see Table 7). This means that most of business and marketing promotional tweets were generated through desktop devices.

To examine whether the nature and message types of Super Bowl related tweets were different between official Twitter sources and business sources, the three message types were further examined by the sources that each message was produced from. Out of all 2,061 tweets generated through Twitter official sources, more than half of these tweets were Retweet (53.3%) and Reply (8.8%), while 37.8% of them were Singleton. On the other hand, among 578 tweets generated through business sources, 88.8% of them were Singleton only with small portions of Retweet

Table 9

No. of Tweets and Users by Top 10 Official
and Top 10 Business Sources from "Sample Data"

	Top10 Official Sources			Top10 Business Sources		
	Tweets	Users	Tweets per user	Tweets	Users	Tweets per user
Singleton	776	689	**1.13**	373	130	**2.87**
Reply	181	173	1.05	4	4	1.00
Retweet	1,073	1,026	1.05	33	30	1.10
The number of "Sample Data" (Super Bowl commercial related tweets)	2,030	1,888	1.08	410	164	2.50

Table 10

The number of Identical Tweets of the Top 10 brand names by
Twitter Official and Business Sources from "Sample Data"

Source	Tweet Count	Identical tweets
Official Sources	1,338	150 (11.2 %)
Business Sources	345	238 (69%)

(10.5%) and Reply (0.7%) (See Table 8). This means that users who used official Twitter sources tend to have more interactions with other users by sending out more Retweets or Reply than Singleton, while users who used business sources tend to generate one-directional (e.g., Singleton) tweets. Table 8 summarizes the message type of Super Bowl related tweets generated through Twitter official sources and business sources.

To find out whether there are differences in the amount of tweets generated by Twitter official sources and

Table 11

Examples of Identical Tweets from Business Sources from "Sample Data"

Tweet	Source
Chrysler stands behind 'America's Import' Super Bowl ad featuring Bob Dylan http://t.co/a43obiRA6g	dlvr.it
Chrysler stands behind 'America's Import' Super Bowl ad featuring Bob Dylan http://t.co/kr9NoyX0EA	dlvr.it
Learn more about the stories behind @Microsoft's #SuperBowl ad & get inspired for your own project! http://t.co/37wgTzIb79 #technologyrocks	Sprinklr
Learn more about the stories behind @Microsoft's #SuperBowl ad & get inspired for your own project! http://t.co/jANyKD5w1F #technologyrocks	Sprinklr
Learn more about the stories behind @Microsoft's #SuperBowl ad & get inspired for your own project! http://t.co/KReMHazRNE #technologyrocks	Sprinklr
Our own @mpcmi caught up with Seattle musician @SangoBeats to talk Super Bowl, great sports crowds & more: http://t.co/EU63FxrMd8	Tweet-Deck
Our own @mpcmi caught up with Seattle musician @SangoBeats to talk Super Bowl, great sports crowds & more: http://t.co/Np3vgTY9Mz	Tweet-Deck
Our own @mpcmi caught up with Seattle musician @SangoBeats to talk Super Bowl, great sports crowds & more: http://t.co/Or4kVFs3Cf	Tweet-Deck
Bruno Mars Pepsi Super Bowl XLVIII Halftime Show Announcement http://t.co/kQSEfk3jzl	Socia-lOomph
Bruno Mars Pepsi Super Bowl XLVIII Halftime Show Announcement http://t.co/KUstTjwpKA	Socia-lOomph

by business sources, we examined how frequently a single user generated tweets from each source. In this analysis, we only chose top 10 sources from each section: top 10 official sources and top 10 business sources listed in Table 3 (see Table 3). As Table 9 shows, 689 users generated 776 Singleton messages through top 10 official sources (1.13

messages per user) while 130 users generated 373 Single-ton messages (2.87 messages per user) through top 10 business sources. This indicates that users who used business sources generated tweets more frequently than users who used Twitter official sources. This suggests that business sources were more active in generating Singleton tweets than in generating interacting (Retweet or Reply) tweets.

In this analysis, we were also interested in examining whether there were any duplicated messages. Here, we found that business sources generated more identical tweets on top 10 brand names than Twitter official sources. Sixty-nine percentage of all tweets from business sources were the same duplicated messages while only 11.2% of tweets from Twitter official sources were the same (see Table 10). It implies that those brand names mentioned through business sources were intentionally pushed by marketers to create social buzz on Twitter. Table 11 shows the examples of identical tweets generated through business sources. Two identical tweet messages, "Chrysler stands behind 'America's Import' Super Bowl ad featuring Bob Dylan," show two different URLs which were embedded in tweet messages, but they actually came from the same source, dlvr.it.

Discussion and Conclusion

This study aimed to address the overall Twitter usage patterns by examining message types, devices and platforms used. Instead of relying on the audience's response (e.g., survey or experiment) or traditional content analysis, this study used a data-mining approach and software that are widely used in the computer science field to

handle the massive amount of data. A total of 5,355,607 tweets ("General Data") and 73,192 Super Bowl commercial related tweets ("Sample Data") were analyzed.

Several findings of this study deserve further discussions. First, from 2012 to 2014, 2013 recorded the highest number of tweets, followed by 2014. This can be explained by the nature of the game as the 2013 Super Bowl was considered one of the most exciting games, yielding a final score of 34-31 with 7 touchdowns, 6 field goals, and one safety. The 2013 Super Bowl game kept the audience's attention to the last minute, making the time between 10:30 p.m. and 10:45 p.m. the most watched part of the game ("CBS Claims," 2013). In addition, the game yielded several NFL records, such as the touchdown by a 190-yard kick-return (4th touchdown), a touchdown by a quarterback, and a 34-minute blackout due to a power outage, marked the dynamic nature of the game. Such a dynamic game might be a reason for the high number of tweets exchanged in 2013. On the other hand, the 2014 Super Bowl game was recorded as the most watched Super Bowl and the most watched program in U.S. television history, reaching 112.2 million viewers (O'Connell, 2014; Steinberg, 2012), but did not generate the highest number of tweets. This implies that the dynamic nature of the game might be a more important factor in predicting or understanding Twitter usage. This interpretation can be further supported by the finding on the Super Bowl commercial tweets. In 2014, the portion of Super Bowl commercial tweets significantly reduced to 0.2%, compared to 1.7% in 2013 and 2.5% in 2012. Even if the 2014 Super Bowl game recorded the highest viewership, the game itself was not exciting, yielding a final score of 43-8 with a

big lead by the Seahawks. Such a one-sided game might make people engage in other conversations or other activities rather than paying attention to a broadcasting game and commercials.

Second, the study yielded that the most popular message type for Super Bowl commercial related tweets was the Singleton. This finding implies that Twitter users are not "actively interactive" as marketers would hope to see. This confirms the previous studies that showed lack of interactivity among Twitter users even if one of the unique characteristics of Twitter as a social media platform is the interactivity (Muntinga et al., 2011; Shao, 2009). This has important implications for Twitter and other social media networking sites since advertisers are more likely to pay for user engagement rather than for user impressions. Marketers need to develop or add some features on social networking sites to encourage more engagement and interactions among users.

Third, the study found that individual users prefer mobile devices to desktops when they tweet, and prefer official web pages or the mobile applications provided by Twitter even though there are many diverse applications or web pages available. This can be interpreted as people feel using Twitter's official sources safer and secure than third-party sources as well as easier to use. This finding suggests that mobile apps are good places to run any promotional messages to reach further target audiences, and Twitter's official sites or apps would be more efficient venues for marketers.

Fourth, we found that tweets generated through business sources were different from those through official sources in terms of message type, devices, and the nature.

The tweets from business sources used more desktop devices, took a Singleton type, and provided more duplicated messages (69%) while tweets from official sources used more mobile devices and took a Retweet type with fewer duplicated (11.2%) messages. This was an interesting finding in understanding how Twitter is used differently between individual users and business profit-oriented users.

This study is not without limitations. It did not provide an in-depth analysis of the Twitter content at a micro-level. Accordingly, the motivations or reasons as to why people tweeted at certain moments are unknown. In addition, this study does not provide an insight on the understanding of how closely people are connected or who is a key player in the networked world. Adding these areas in a future analysis would provide a solid literature on social media uses, particularly on the Twitter usage by examining their roles in the communication process.

Overall, this macro-level analysis has contributed to the study of the Twitter usage pattern by examining message types, URL sources, and devices that people used. As consumers are multi-tasking with several media and more fragmented, it becomes more important to have a better understanding of Twitter usage patterns. Also, a recent industry report indicated that people who used Twitter, whether actively tweeting or just following, were 62% more likely to recall the brands which advertised during a TV show than those who did not use Twitter (Warc, 2016). Therefore, understanding the value of Twitter in marketing and understanding how consumers use Twitter becomes more important and timely. By analyzing massive data, this study provided a more holistic picture of Twitter usage patterns. As Twitter is using more complicated in-

terfaces through technologies, understanding consumers'
media uses and experiences with Twitter will be challeng-
ing. We hope that this study had led us one step closer to
facing such challenges.

References

Advertising Age. (2016). *Marketing Fact Pack*, Retrieved from
          http://adage.com/d/resources/resources/whitepaper/2016-
          edition-marketing-fact-pack

Adobe Digital Index. (2014, January 31). Digital & TV 'double
          coverage' key to marketing success at the Super Bowl
          social media is off the sidelines this year. *Advertising
          Age*, Retrieved from http://adage.com.proxy-
          tu.researchport.umd.edu/article/adobe/adobe-digital-tv-
          key-marketing-success-super-bowl/291429/

Baran, S. J., & Davis, D. K. (2011). *Mass communication theory:
          Foundations, ferment, and future*. Wadsworth, Cengage
          Learning.

Barnes, N. G., & Mattson, E. (2009, November 12). The Fortune
          500 and blogging: slow and steady and farther along
          than expected. Retrieved from http://www.umassd.edu-/
          cmr/studiesresearch/fortune500.pdf

Boyd, D. M., & Ellison N. B. (2007). Social Network Sites: Defi-
          nition, history, and scholarship. *Journal of Computer-
          Mediated Communication*, *13*(1), 210-230.

Byun, C., Lee, H., & Kim, Y. (2012). Automated Twitter
          data collecting tool for data mining in social network.
          *Proceedings of the 14th International Conference on
          Information Integration and Web-based Applications &
          Services*, 196-204, doi: 10.1145/2401603.2401621

Campbell, C., Pitt, L. F., Parent, M., & Berthon, P. R. (2011).
          Understanding consumer conversations around ads in a
          web 2.0 world. *Journal of Advertising*, *40*(1), 87- 102.

"CBS claims record Super Bowl ratings in early tally: Early fig-

ures do not include half hour during black-
out," (February 04, 2013). *Advertising Age*. Retrieved
from www.adage.com.

Chen, G. M. (2011). Tweet this: A uses and gratifications per-
spective on how active Twitter use gratifies a need to
connect with others. *Computers in Human Behavior, 27*
(2), 755-762. doi:10.1016/j.chb.2010.10.023

Chu, S., & Kim, Y. (2011). Determinants of consumer engage-
ment in electronic word-of- mouth (eWOM) in social net-
working sites. *International Journal of Advertising*, *30*
(1), 47-75.

Cone Business. (2008). 2008 business in social media study. Re-
trieved March 11, 2010, from http://www.coneinc.com/
news/request.php?id=1183

Duggan, M. (2015, August 19). The demographics of social me-
dia users. *Mobile Messaging and Social Media 2015*, Re-
trieved from http://www.pewinternet.org/2015/08/19/the-
demographics-of-social-media-users/

Dumenco, S. (2011, December 14). And the No. 1 Social-TV Hit
of the Year Is… (Hint: Not the Oscars or Super Bowl).
Advertising Age, Retrieved from http://adage.com/article/
trending-topics/1-social-tv-hit-year/231574/.

eMarketer. (2015, April). Social Network Ad Spending to Hit
$23.68 Billion Worldwide in 2015. Retrieved from http://
www.emarketer.com/Article/Social-Network-Ad-
Spending-Hit-2368-Billion-Worldwide-
2015/1012357#sthash.lBpDFlob.dpuf.

Eversley, M. (2013, February 4). Super engagement record for
Super Bowl. *USA Today*. Retrieved from http://
www.usatoday.com/story/money/business/2013/02/04/
super-engagement-social-media/1890351/

Ferguson, D.A., & Perse, M. (2000). The World Wide Web as a
functional alternative to television. *Journal of Broad-
casting & Electronic Media*, *44*(2), 155-174.

Hollenbaugh, E. E. (2010). Personal journal bloggers: Profiles of

disclosiveness. *Computers in Human Behavior*, 26(6), 1657-1666 doi:10.1016/j.chb.2010.06.014

Homburg, C., Ehm, L., & Artz, M. (2015). Measuring and Managing Consumer Sentiment in an Online Community Environment. *Journal of Marketing Research, 52,* 629-641.

Joinson, A.N. (2008). 'Looking at', 'Looking up' or 'Keeping up with' people? Motives and Uses of Facebook. In *Proceedings of the 26th Annual SIGCHI Conference on Human Factors in Computing Systems* (Florence, Italy, April 05-10 2008), CHI '08, ACM, New York, (pp. 1027- 1036).

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

Kaye, B. K. (2007). Blog use motivations: An exploratory study. in Tremayne, M. (ed.) *Blogging, Citizenship, and the Future of Media*, New York, NY: Routledge, 127-148.

King, I., Li, J., & Chan, K. T. (2009). A brief survey of computational approaches in social computing. *Proceedings of the 2009 International Joint Conference on Neural Networks*. 2699-2706.

Ko, H., Cho, C., & Roberts, M. S. (2005). Internet uses and gratifications: a structural equation model of interactive advertising. *Journal of Advertising, 24*(2), 57-70.

Kumar, A., Bezawada, R., Rishika, R., Janakiraman, R., & Kannan, P.K. (2016). From social to sale: The effects of firm-generated content in social media on customer behavior. *Journal of Marketing*, *80,* 7-25. DOI: 10.1509/jm.14.0249

Kwak, H., Lee, C., Park, H., & Moon, S. (2010). What is Twitter, a social network or a news media? Paper presented at the 19th International conference on WWW, Raleigh, NC, April 26-30.

Larsson, A. O. (2013). Twitting the viewer –Use of Twitter in a talk show context. *Journal of Broadcasting & Electronic Media*, *57*(2), 135-152.

Learnonth, M. (2013, February 25). When did Twitter grow up? Answer: Now. Marketing has become an in-the moment game, thanks to one company, *Advertising Age*, Retrieved from http://adage.com/article/digital/twitter-grow/239992/

Lee, H., Han, Y., Kim, K. K., & Kim, Y. (2014). Sports and Social Media: Twitter Usage Patterns during the 2013 Super Bowl Broadcast. *Proceedings of the 4th International Conference on Communication, Media, Technology and Design*, 250-259

Lin, C.A. (2006). Technology fluidity and on-demand webcasting adoption. *Telematics & Informatics*, *25*(2), 84-98.

Miller, R., & Washington, K. (2013). Consumer use of media & the Internet. *Entertainment, Media & Advertising Market Research Handbook*, *13,* 21-28.

Muntinga, D. G., Moorman, M., & Smit E. G. (2011). Introducing COBRAs. *International Journal of Advertising*, *30*(1), 13-46.

O'Connell, M. (2014, February 3). TV ratings: Super Bowl XLVIII is most watched in history with 112.2 million viewers. *The Hollywood Reporter*. Retrieved from http://www.hollywoodreporter.com/live-feed/tv-ratings-super-bowl-xlviii- 676651

OMNICORE. (2017, January 24), Twitter by the Numbers: stats, demographics & fun facts. Retrieved from https://www.omnicoreagency.com/twitter-statistics/

Papacharissi, Z., & Rubin, A. M. (2000). Predictors of Internet use. *Journal of Broadcasting & Electronic Media*, *44*(2), 175-196.

Pehlivan, E., Sarican, F., & Berthon, P. (2011). Mining messages: Exploring consumer response to consumer- vs. firm-generated ads. *Journal of Consumer Behaviour*, *10,* 313-321, Published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/cb.379

Roy, S. K. (2009). Internet uses and gratifications: A survey in the Indian context. *Computers in Human Behavior*, *25,*

878-886.

Schultz, E. J. (2016, January 4). See the 'crash the Super Bowl' finalists' ads. *Advertising Age*, Retrieved from http://adage.com/article/special-report-super-bowl/crash-super-bowl-finalist-ads/301978/.

Shao, G. (2009). Understanding the appeal of user-generated media: a uses and gratification perspective. *Internet Research*, *19*(1), 7-25. doi:10.1108/10662240910927795.

Stafford, T. F., Stafford, M. R., & Schkade, L. (2004). Determining uses and gratifications for the Internet. *Decision Sciences*, *35*(2), 259-288.

Steinberg, B. (2012, February 6). Super Bowl breaks its ratings record once again. *Advertising Age,* Retrieved from http://adage.com.proxy- tu.researchport.umd.edu/article/special-report-super-bowl/super-bowl-breaks- ratings-record/232563/

Stelzner, M. (2013). The 2013 social media marketing industry report. *Social Media Examiner.* Retrieved from http://www.socialmediaexaminer.com/SocialMediaMarketingIndustryReport2013.pdf.

Tan, S. S. (1985). *Mass communication: Theories and Research*, New York, NY: Macmillan.

Twitter Inc. (n.d.). Twitter Usage / Company Facts Retrieved May 23, 2017 from https://about.twitter.com/company

Warc. (2016, March 21). TV Tweeters have higher ad recall. *Warc.com*. Retrieved from http://www.warc.com/LatestNews/News/EmailNews.news?ID=36426&Origin=WARCNewsEmail&CID=N36426&PUB=Warc_News&utm_source=WarcNews&utm_medium=email&utm_campaign=WarcNews20160321.

Wohn, D. Y., & Na, E. (2011). Tweeting about TV: Sharing television viewing experiences via Social media message streams. *First Monday, 16*(3), 1-14. Retrieved from http://web.a.ebscohost.com.proxy-tu.researchport.umd.edu/ehost/detail/detail?vid=3&sid=e7ccfea4-e8f1-4794-bec3.