Shortcomings of Twitter as a Marketing Tool

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Advertising is a core aspect of how companies communicate with customers in order to promote their product or themselves and increase sales. The establishment of social media presented a novel avenue for advertising and marketing. Social media represents a more personalized, direct way of reaching current and potential customers and for receiving publicly visible feedback in real time. In 2014, money spent on advertising via social media had reached $16 billion, and by 2016 that number had nearly doubled to $31 billion; it is clear that many companies see social media as a worthwhile investment of their time and energy [1].

One of these mediums, Twitter, allows users to "tweet" messages of up to 140 characters to anyone interested in viewing them. Twitter provides an excellent tool for corporations to establish more of a public personality and to broadcast their thoughts, as well as giving feedback directly related to the content they produce. Additionally, even if Twitter users are not directly communicating with companies about their products, they will often send out messages about those products, both good and bad, for anyone to read.

The Twitter API gives interested developers the ability to obtain data about the tweets being made by users world-wide. Depending on what your interests are, you can analyze tweets selected by topic, popularity, lack of popularity, language, the sorts of topics being discussed, the popularity or lack thereof of the tweeters themselves, and a whole host of other options. All of these possibilities are readily given to developers by Twitter itself, in the hopes of spurring interest in the opportunities presented by such a broad depth of data about a huge user base. If other entities determine that the data that can be provided by Twitter is of legitimate value to their corporation, Twitter provides, for a price, even greater analytical capability and support. For advertisers, this represents the opportunity to glean data about how their products are seen, used, and discussed among their customer base.

To us, Twitter represented an opportunity to identify companies that had a shortcoming in their use of social media. Because Twitter allows personalized communication between consumers and the company, Twitter can be an excellent mechanism for fostering goodwill by establishing a positively viewed company personality and giving helpful feedback to customers in real time. We concluded that a company with extensive brand awareness but flagging sales would benefit from more aggressively marketing themselves on Twitter, with increased revenue sure to follow. We would begin by identifying these companies, provide data to convince them that more consistent advertising and marketing via Twitter would be profitable, and offer our services in helping them to do so.

We performed some initial experimentation using the Twitter API to familiarize ourselves with the development tools. First, we ensured that we could access the real-time data flowing from Twitter's streaming API. We demonstrated our capability to do so by collecting tweets in real time and storing them locally. Much of the source code used as a foundation for our efforts was taken from Matthew Russell's *Mining the Social Web*, which provides a great deal of useful code for interacting with the Twitter API [2].

Here, we used "Blackberry" as a keyword to search for. We did not expect to get a significant volume of tweets while using the streaming API, as Blackberry's line of products was discontinued in the fall of 2016. However, it provides us with the necessary data for our proof of concept, and provides a good foundation of data regarding Blackberry, which we saw as a potential opportunity for our business.

After implementing the code provided by the Twitter API, we collected 270 live tweets involving the term 'Blackberry' over the span of about 20 minutes. Our next step was to refine our ability to sift through this data and retrieve more detailed information from it. We will begin by analyzing the content of the tweets.

An initial assessment of the words found in the tweets can be seen in Figure 1. This figure shows the top 30 words by frequency in the 270 tweets previously collected. Here, we can clearly see that the bulk of the most common words are either Twitter terminology or verbs and prepositions that occur extremely frequently in the English language. As is common in data mining, we will remove several hundred of the most common English words in an attempt to gather more useful data from the tweets [3].

After removing the most common English words, the complexion of the top 30 words becomes much less cluttered, as seen in Figure 2. The words show that the discussion involving Blackberries is wholly centered around the political furor centered on emails stored on Hillary Clinton's Blackberry.

Word	Count
to	188
Blackberry	179
FBI	153
RT	147
Emails	119
Her	109
Instead	101
of	86
Hillary's	72
Access	59
amp	59
Initially	58
Asked	58
Permission	58
access	56
BlackBerry	54
Hillarys	54
Seizing	51
Comey's	51
Begged	51
Aides	51
Turn	51
Them	51
Over	51
the	44
Thomas1774Paine	40
httpstco…	39
Licensing	32
Timex	32
Is	32

Figure 1. A table of the 30 most frequently occurring words, including stop words.

Word	Count
Blackberry	179
FBI	153
Emails	119
Instead	101
Hillary's	72
Access	59
amp	59
Initially	58
Asked	58
Permission	58
access	56
BlackBerry	54
Hillarys	54
Seizing	51
Comey's	51
Begged	51
Aides	51
Turn	51
Thomas1774Paine	40
httpstco…	39
Licensing	32
Timex	32
Patents	31
Android	30
Headlines	30
fur	30
initially	28
asked	28
permission	28
emails	28

Figure 2. A table of the 30 most frequently occurring words, not including stop words.

Having completed our assessment of the individual words, we will now proceed to demonstrate that we can also order the tweets themselves by popularity. Using the same Blackberry-focused dataset, we can see that the most popular tweets are, once again, almost entirely focused on Hillary Clinton's Blackberry and her use of it. The tweets are displayed in Figure 3.

```
+--------+-----------------+------------------------------------------------+
| Count  | Screen Name     | Text                                           |
+--------+-----------------+------------------------------------------------+
| 91502  | ParisHilton     | RT @ParisHilton: Hey friends, I lost my        |
|        |                 | blackberry. 😭 So if your trying to reach me, then |
|        |                 | text me on one of my three iPhones. 😊          |
| 784    | TomFitton       | RT @TomFitton: FBI Primarily Sought 'Consensual |
|        |                 | Access' to Clinton's Blackberry Emails.        |
|        |                 | @JudicialWatch exposes the sham...             |
|        |                 | https://t.co/SSG…                              |
| 224    | Thomas1774Paine | RT @Thomas1774Paine: PRETTY PLEASE: Instead of |
|        |                 | Seizing Hillary's Blackberry Emails, Comey's FBI |
|        |                 | Begged Her &amp; Aides to Turn Them Over -RT- h… |
| 207    | Nab331_         | RT @Nab331_: Abuja girls : iPhone X            |
|        |                 | Kano girls : iPhone 6 -7                        |
|        |                 | Sokoto girls : Blackberry bold 5               |
|        |                 |                                                |
|        |                 | Kaduna girls: Fruitytango &amp; Seesa…          |
| 68     | A_single_bear   | RT @A_single_bear: My fur seems to hurt        |
|        |                 | Maybe the blackberry bush                       |
|        |                 | did this to my fur                              |
|        |                 |                                                |
|        |                 | #bearku                                        |
|        |                 | #haiku                                         |
| 43     | SheilaBoom915   | RT @SheilaBoom915: -Sweet ice creams-  "- ¡Te ves |
|        |                 | tan dulce, Bubblegum! - G-gracias, Blackberry..." |
|        |                 | #FNAFHSICECREAM #FNAFHS…                        |
| 41     | Thomas1774Paine | RT @Thomas1774Paine: Instead of Seizing Hillary's |
|        |                 | Blackberry Emails, Comey's FBI Instead Begged Her |
|        |                 | &amp; Aides to Turn Them Over https://t.co/…    |
| 28     | alozrasT        | RT @alozrasT: FBI initially asked Hillary's    |
|        |                 | permission to access Blackberry emails         |
|        |                 |                                                |
|        |                 | 📱Consensual access instead of search warrant… |
| 23     | CrackBerry      | RT @CrackBerry: CrackBerry is giving away a    |
|        |                 | BlackBerry KEYone Black Edition!               |
|        |                 | https://t.co/I0jW25ghVy https://t.co/wnp3sXP7Ut |
| 12     | AMike4761       | RT @AMike4761: FBI Initially Asked #Hillary 's |
|        |                 | Permission to Access Her Blackberry Emails rather |
|        |                 | than a Warrant! Corrupt?  #ma4t https://…      |
+--------+-----------------+------------------------------------------------+
```

Figure 3. A table of the 10 most popular tweets

In addition to assessing the verbal content and popularity of the tweets themselves, we also can delve into the Twitter-specific aspects of the messages. Twitter includes features called hashtags, which Twitter users apply to "relevant keywords or phrases" [4]. These can represent the most important part of the tweet, and merit special consideration. Twitter also allows you to direct your tweet at particular users, indicating that they are the intended recipient of the message. Both of these concepts, depending on context, can be extremely important in understanding the overall purpose of the tweet.

Because of their particular importance, the top 10 most frequently occurring hashtags and user mentions have also been extracted from the data and are displayed in Figure 4. Only seven user mentions are present because in the live tweets collected, no other user mentions

occurred other than the ones listed here. Once again, Hillary Clinton's use of her Blackberry was one of the more popular concepts. It is interesting to note that even the most popular hashtags and user mentions that were obtained in the search involving Blackberry had 15 or less total occurrences.

```
+--------------------+-------+
| Hashtag            | Count |
+--------------------+-------+                 +-----------------+-------+
| bearku             |    15 |                 | User            | Count |
| haiku              |    15 |                 +-----------------+-------+
| Hillary            |     9 |                 | JudicialWatch   |    10 |
| ma4t               |     9 |                 | BlackBerry      |     3 |
| ALDUB26thMonthsary |     3 |                 | JonyIveParody   |     1 |
| recipe             |     1 |                 | scottbannerman1 |     1 |
| FNAFHSICECREAM     |     1 |                 | BBMobile        |     1 |
| FNAFHS             |     1 |                 | UberFacts       |     1 |
| technology         |     1 |                 | CrackBerry      |     1 |
| celular            |     1 |                 +-----------------+-------+
+--------------------+-------+
```

Figure 4. Tables of the 10 most frequently occurring hashtags and user mentions.

In our use of Twitter, we are not only concerned with the messages that receive popularity when published on Twitter. Twitter also allows users to have what they call 'followers'. Followers see all messages posted by individuals they follow, but the relationship does not inherently extend in the other direction.

Individual users can have many followers, which carries information about the extent of their Twitter activity and interactions. More significantly, though, their number of followers can carry hugely meaningful amounts of information regarding the strength of both their personal brand and whatever brands they are strongly associated with. For example, Tim Cook, the CEO of Apple, is following only 60 people but has 6.55 million followers. This indicates that he does not use Twitter as a social media device for establishing relationships, but rather that he uses it with great success as a tool for brand management.

For the purposes of our business plan, we will obtain a more detailed assessment of the social context of John Chen, the CEO of Blackberry. Figure 5 shows an assortment of 20 Twitter users that John Chen follows, and includes the username they have chosen as well as the User ID that was assigned to them by Twitter. Figure 5 also shows an assortment of 20 of John Chen's followers, and again includes their chosen username and assigned User ID.

```
+----------------------+----------------------+
| ID                   |     Follower's Names |
+----------------------+----------------------+
| 725644715006128128   | Anna jean   gesTOpa  |
| 44994601             |               Mohis  |
| 906960943552319488   |       Eric C Mwangi  |
| 15256188             |       Wendy Maynard  |
| 71278110             |              Vineet  |
| 348029933            |       Beautiful Data  |
| 309599064            |        Flycastmedia  |
| 1422975673           |       Johannes Egger  |
| 909229620259639296   |         Clary Walsh  |
| 1274703218           |             H Fuadi  |
| 906948897054044161   |          الـعـنـيـبـي  |
| 871373004097376256   | Carol Udell CanView  |
| 114744695            |        anas ebrahem  |
| 910056549942427653   |      Mennobeybernard  |
| 509008109            |      Ellen Frederick  |
| 2335328114           | soberpartnersnetwork |
| 18865334             |           geoffhirst  |
| 909410834811559942   |        Business Plan  |
| 2428793455           |         Joel Parisoe  |
| 908502184391774209   |          Ahmed Jmyi   |
+----------------------+----------------------+
```

Figure 5. Tables containing the names of 20 followers and 20 users followed by John Chen

In some contexts, it can be useful to consider what we will refer to as "friends". This term refers to those users who you follow and you also follow you. Depending on the context, it can identify an array of relationships, from business to professional to personal. Figure 6 shows a full list of John Chen's friends on Twitter, including their chosen username and assigned User ID.

```
+------------+----------------------+
| ID         |    Mutual Friend Name |
+------------+----------------------+
| 3222372196 |        Cathy Bessant  |
| 3300928528 | TheGentlemanMagazine  |
| 59582886   |        Neelam Sandhu  |
| 25553720   |        Michael Harris  |
| 123420826  |               Cardy   |
| 7376892    |    Claudia Winkleman  |
| 1287172722 | Bernard J.Tyson, CEO  |
| 20106796   |        Amber Kanwar   |
| 1394399438 |         John Legere   |
| 22587869   | Kristie Lu Stout ✌️  |
| 241845573  | BlackBerry Mid East  |
| 917325176  |       BlackBerry News  |
| 263050595  |      BlackBerry India  |
| 127733432  | BlackBerry Indonesia  |
| 36916922   |         BlackBerryHelp  |
| 137998832  |      BlackBerry France  |
| 131375346  |     BlackBerry Español |
| 65727873   |         BlackBerryDev  |
| 180910868  |       BlackBerryBantu  |
| 1676078360 |                  BBM   |
| 44247973   |      AyudaBlackBerry   |
| 14580438   |           BlackBerry   |
+------------+----------------------+
```

Figure 6. Table of the mutual friends of John Chen

As noted at the outset of this report, it is widely believed that popularity on Twitter can be directly correlated with the strength of your brand, and therefore with sales. Our initial research into the strength of Blackberry's brand was driven by this notion. We were expecting to find some association between the strength of the brand of other smartphone manufacturers and their market share. Consequently, we thought that given the number of Twitter followers that Blackberry still possesses (about 4.5 million), Blackberry had the opportunity to leverage this ready audience to boost their sales and bring them in line with the other manufacturers.

However, as we gathered more data, it became clear that Twitter presence cannot be tied so directly to market share. Figure 7, shown below, shows the Twitter followers and market share for smartphones in the first quarter of 2016. Here, it is clear that Blackberry's Twitter presence vastly exceeds the presence of its competitors aside from Samsung and Tim Cook, who serves as Apple's primary Twitter account, and is nearly 66% of Apple's size despite the fact that their popularity also includes their long-standing and extremely successful operating system and line of desktop computers and software. With no other context, this would be a promising indicator that Blackberry's media presence would ordinarily be tied to strong sales, but the graph shows a clear lack of linearity. Specifically, LG and HTC, like Blackberry, both fail to fit with the other data points, leaving us in a position where we can no longer draw the desired conclusion [5].
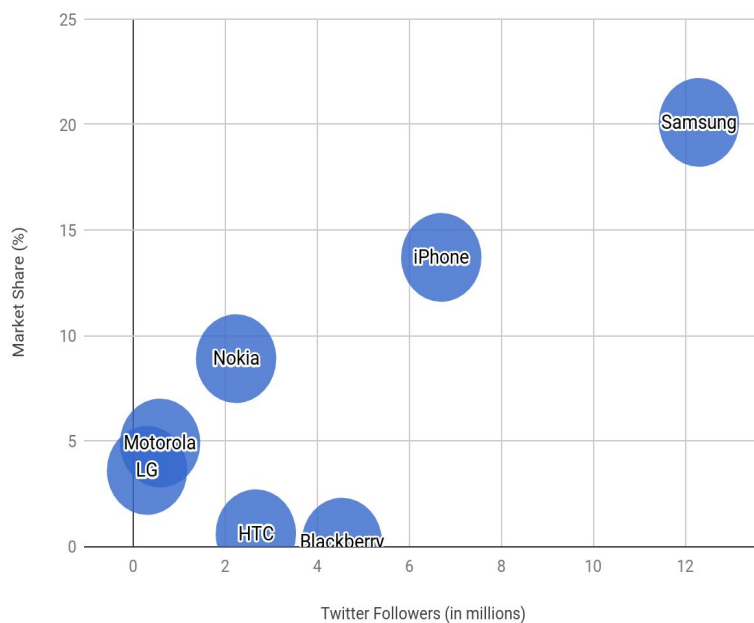
Figure 7. Scatterplot of smartphone manufacturers' Twitter followers against market share

In an attempt to explain this trend, we included a sentiment analysis produced by assessing the most recent 200 tweets directed at the primary Twitter account for each manufacturer. Figure 8 shows the results of this sentiment analysis. The size of each bubble represents the extent of positive sentiment found during the analysis, meaning that larger bubbles indicate more positivity and smaller bubbles indicate more negativity. We were expecting to see significantly negative sentiment for the brands with higher numbers of followers and low market share, but found the opposite.
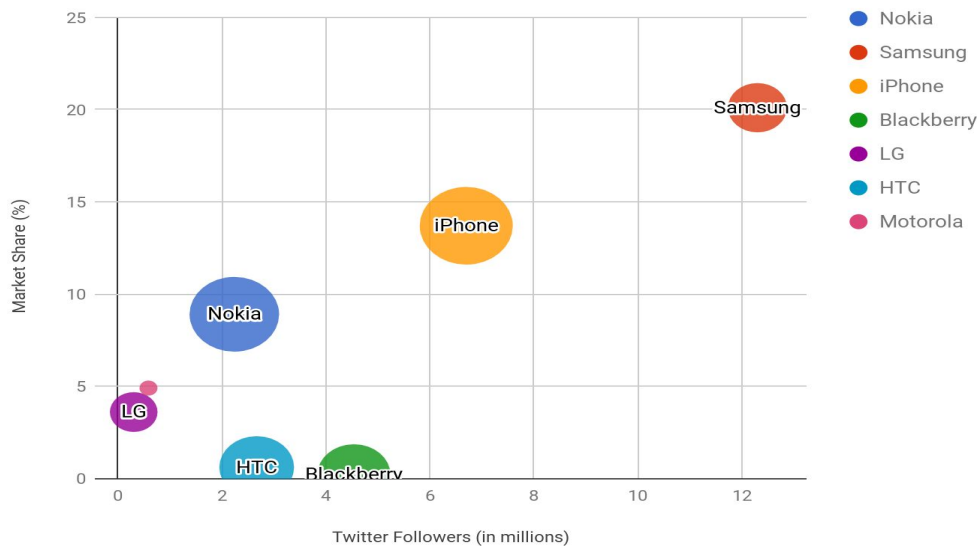
Figure 8. Bubble chart of smartphone manufacturers' Twitter followers against market share, including sentiment analysis

After investigating other markets with similar characteristics (extremely widespread use, substitute goods, unrestricted availability), we saw a similar lack of trends appear when including sentiment analysis.

Figure 9 shows similar data for sneakers, console gaming, and car sales. While the companies with higher market share or revenue often have stronger brand presence, this is not consistently true. Furthermore, including sentiment analysis only serves to confuse the issue even further. Some companies with higher than expected market share or revenue have relatively negative sentiment analysis, and the opposite is true as well [6][7][8].
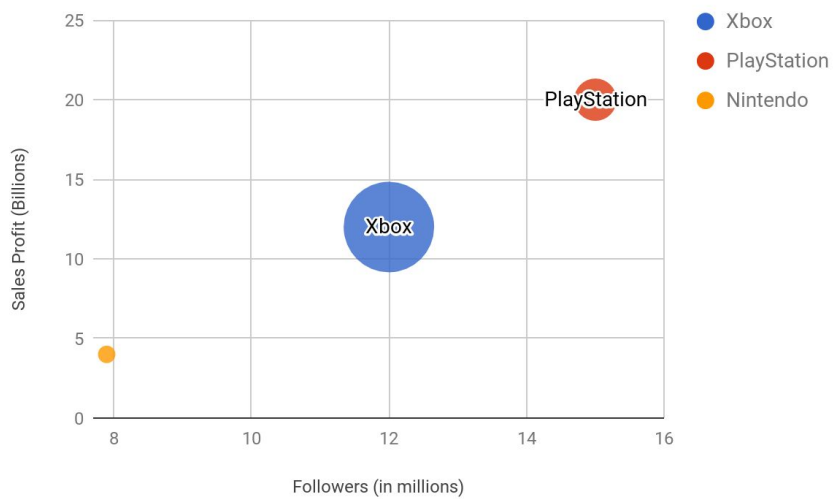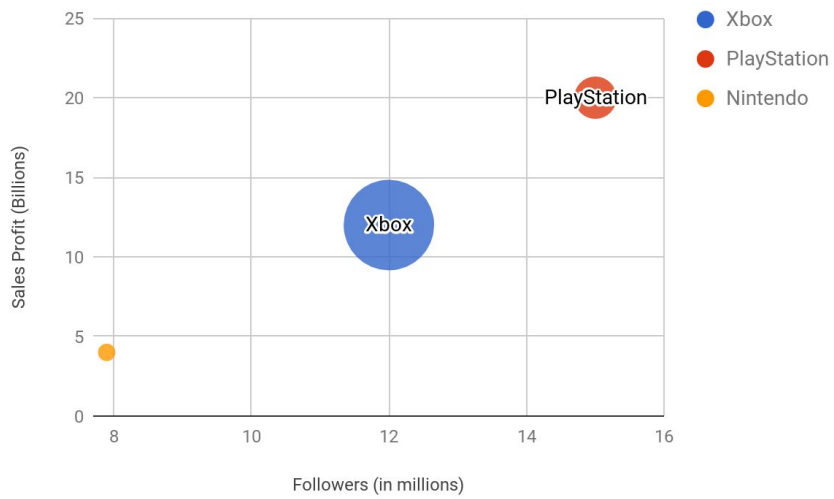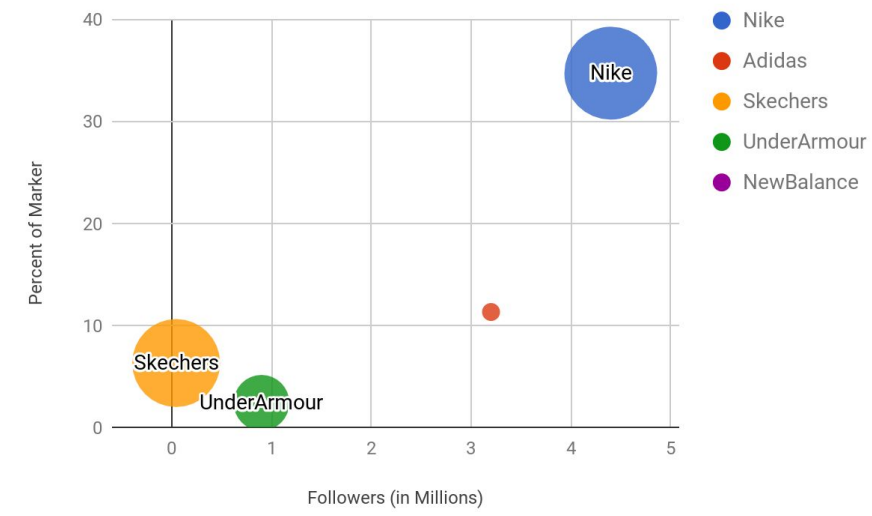
Figure 9. Bubble chart of other manufacturers' Twitter followers against market share or revenue , including sentiment analysis

Taken holistically, we believe that our data has shown that putting too much faith in the relationship between positive Twitter presence and strength of sales may lead to suboptimal decisions, as the underlying truth is likely to be more nuanced than this. This is supported by academic literature [9] [10], which suggests that there are specific times in the lifecycle of most products where aggressive use of social media can boost sales. Outside of these times, the impact of Twitter marketing is much less strong.

Therefore, we propose to establish a company oriented around helping companies to find the right times to use social media to generate positive media attention and market the products that they offer, and otherwise to reorient their marketing budget towards media that will provide greater returns. We do not intend to completely discount the potential utility of Twitter, as the ability to reach out on an individual level to potential customers is guaranteed to have some value. However, a company that does not have flexibility in their budget is likely to be occasionally wasting their efforts. Given the extent of investment in social media cited above ($31 billion in 2016 and growing rapidly), most companies cannot afford to have such a significant portion of their advertising budget used ineffectively.

In summary, while it is often valuable to ensure that your company receives widespread positive publicity, we do not find that the publicity obtained from discussion and followers on Twitter is sufficiently valuable at all times to merit large-scale and uninterrupted attention from advertisers. Moreover, we find that advertising can perhaps be augmented by Twitter engagement at appropriate times, but that simply having a large Twitter base does not translate consistently to revenue. We believe that a sound business could be created on the basis of advising corporations on appropriate timing for Twitter investment in order to optimize their spending and maximize their return on investment.

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