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Research paper

Impact of social media on e-commerce

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Abstract

Social network has gained remarkable attention in the last decade and as the evolution take place, accessing social network sites such as Twitter, Facebook, LinkedIn, Instagram and YouTube have become very affordable. As a large population uses one or the other social networking site, it has become very convenient for companies to reach their consumers through these sites. The main objective of this project is to identify the role of social media marketing strategy and evaluate its importance over traditional marketing strategy in building brand names and consumer behavior. The dataset on which the study has been carried out consists of a sample of tweets on @Samsung-Mobile, the quar-terly sales of @Samsung Mobile and the information of its followers on Twitter. The analysis and findings of the study highlighted the geo-graphical distribution of the followers of @Samsung Mobile, the market outreach of the brand, and the relationship between the increase in followers and the quarterly sales of @Samsung Mobile.

Keywords: *Social Media; E-Commerce; Twitter Analytics; Sentiment Analysis.*

1. Introduction

Over the past decade, media has witnessed a huge transformation, consumers are progressively using social networking sites to look for information regarding various products and services, instead of relying on traditional methods such as television, radio, and magazines etc. [1]. Every seventh person in the world now owns a Facebook profile and nearly four in five Internet users are associated with at least one social media site. With the ever-increasing number of internet and social media users, it has become inevitable for major brands to understand online customer behavior. The emergence of social media has led to a subsequent change in media consumption which is pushing companies and organizations to adopt social media as one of their marketing strategies and public relation tools [2]. Therefore, social media has become an increasingly familiar platform employed in E-Commerce to market services and resources to current and prospective customers.

1.1. Social networks and social media

The term social network was first coined to differentiate between networks that were used for business purposes from those used for socializing amongst people. The definition of social networking has been extended to include grouping of individuals into specific groups especially in workplace, universities and high schools, however the most popular accepted definition of social networks relates to the interactive websites which provides users with message boards, chat rooms, and the ability to leave comments and have a discussion with other people [3]. Alternatively social networks is also referred to as a virtual community website that brings people together to talk, share ideas and interests, or make friends. This type of collaboration and sharing on social networking sites is known as social media. Unlike traditional media that is typically created and controlled by only a bunch of people, the social media allows users to share their opinions, views and encourages interactions and community building shaped by consumers [4].

The term "Social Media" has been derived from the words, "Social" and "Media" which are discussed as follows:

Social: the term 'Social' refers to interacting with other people for exchange of information characterized by the friendly companionship or relations.

Media: the term 'Media' refers to the instrument of the communication such as radios, television, newspapers, magazines, internet etc. that reach people widely.

So we can say that social media is a web based social instrument of communication that enables people to interact with each other by both sharing and consuming information. Safko and Brake [5] observed that social media is an umbrella term referring to activities, practices, behaviors among communities of the peoples who gather online to share and exchange information, knowledge and opinions using communicational media. According to Weinberg [6] social media relates to the sharing of information, experiences and perspectives through community oriented websites. Social media uses web based technology to transform and broadcast media monologues into social media dialogues. Since last decade, social media has evolved from being a simple communication hub to an agent of change, which has effected every day to day activity of humans and thereby changing people's lives.

1.2. Effect of social media on various areas

The various areas which have had a lasting and permanent effect of social media are as follows [3]:

1.2.1. Politics and public service

The way personal computers that changed forever the way businesses were conducted. Social networks are altering the demography of our society ranging from politics and public service to business and customer satisfaction. Facebook has become the de-facto

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platform for how non-profit organizations, environmental activists, and political factions reaching out to thousands of potential volunteers. Twitter is generally used by almost all progressive politicians to promote their causes. Thanks to the social networks, fields like politics is no longer limited to the political leaders but people can also express their concerns and opinions, share their ideas, and even communicate with political leaders on a one-on-one basis

1.2.2. Marketing and advertising

With the advent of social media, marketing and advertising strategies have transformed themselves from industries reliant on mass market channels such as television, radios to the social platform. All the major brands and organizations today boasts of having large fan base and followers on all major social media platforms like Facebook, Twitter, YouTube, Instagram etc. Social media platforms are not only cost effective but also increase the proximity between the producer and consumer.

1.2.3. Journalism

Social media has provided people with quick and easy way for sharing links and information with a large number of people via Facebook or Twitter. Some news websites present their visitors with a list of news items recommended by their friends because they realize an endorsement from acquaintances carries extra weight. On the other hand, social networks have also given unprecedented rise to citizen journalism. From traffic updates, to natural calamities, everyone who has access to social networking sites is virtually just few clicks away from being a citizen journalist.

1.2.4. Business

Almost every major business organization has a social presence today. Both existing and emerging businesses are now aggressively using social networking sites to promote their products, services, and gain invaluable feedback from their customers. In fact, for businesses, interaction via social network has almost become a de-facto standard for assessing their customer service. It has now become a common to see small or home based businesses that operate solely through their Facebook accounts.

1.2.5. Recruitment

LinkedIn has considerably transformed how HR professionals look for and thus recruit potential employees. However, there are arguments about privacy violation; LinkedIn has undoubtedly facilitated career advancements, recruitment and professional networking to great extent.

1.3. Types of social media platforms

The most commonly used social media platforms are [7]:

1.3.1. Facebook

Facebook is the largest social network on the web with respect to name recognition as well as total number of users. It has approximately 1.8 billion active users and it acts as a wonderful platform for connecting people across the globe with your business. Since the last decade, Facebook has evolved from a basic website into a multi-dimensional network and a mobile platform where anyone can connect with anybody across the world. Keeping in mind, the Pages feature of Facebook, it can really help a lot in one's business.

1.3.2. Twitter

Twitter is a platform where one can express one's views with short text messages along with other media. Twitter is a great interface to communicate with literally anyone in the world just by mentioning their usernames in their posts. This social networking site is a great way to advertise and market one's business. It is also an effective channel for handling customer service.

1.3.3. YouTube

The most famous video-sharing platform that has over a billion users where the users can not only view the content posted by others, but also upload, rate, share and comment on the videos as well. If one wants to engage audience by posting an advertisement of their work or business, there could be no better platform than YouTube.

1.3.4. Instagram

Instagram is a visual social media platform that is totally based on photos and videos posts only. It is also owned by Facebook and is different from others with respect to various filters provided and other photo editing options provided.

1.3.5. LinkedIn

LinkedIn is a social networking site that is dedicatedly used for business and employment-oriented services. LinkedIn allows members that may be workers as well as employers to create profiles in an online social network which may portray real-world professional relationships [8].

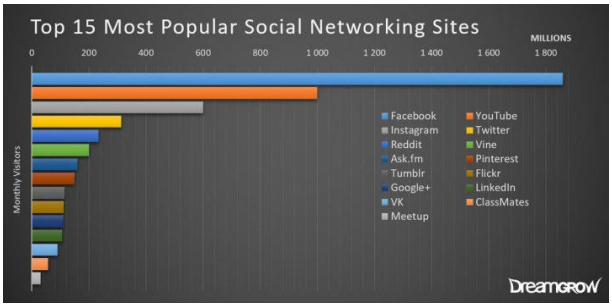


Fig 1: Most Popular Social Networking Sites [9].

The figure 1 shows the graph of top 15 social networking sites in the world as on February 2017 [9]. As it is clearly visible, Facebook is leading the pack followed by YouTube, Instagram and Twitter

1.4. Project report structure

The project report has been divided into 6 major sections. Section 1 gives an introduction of the social media and commonly used social media platforms. Section 2 gives a brief overview of role of social media in e-commerce detailing the advantages and challenges of social media marketing. Section 2 also discusses the related work with respect to the analysis of social media data. Section 3 focusses on defining the problem statement of the research work and describing the major research objectives of the project. Section 4 describes the research methodology discussing in detail the tools and data set used for research project. The results and analysis of the data has been clearly mentioned in section 5 of the report also highlighting the findings of the project. The last section 6 summarizes the entire work done and presents the future scope for the project.

2. Literature review

2.1. Social media and e-commerce

In order to understand their customer in a better way and finding their inclination towards their products, the marketers and advertisers are always looking for a number of ways. This requires a lot of information to be gathered about the customers. This information could be gathered from social media about online users which could be further analyzed to trace the behavior of consumers. The various businesses are using social networks like Twitter and Facebook to help them sell more products and services [10].

2.2. Social media marketing

Social media marketing is the latest trend that evolved since last few years when it started ruling online communication. It is a form of internet marketing that uses various social media platforms in order to achieve marketing and advertising objectives. Social media marketing basically involves sharing of content, videos, and images for advertising reasons. The various marketing techniques adopted by business is focused on targeting the right audience, Consumer Online Brand related activities, and electronic word of mouth.

2.3. Advantages of social media marketing

The various advantages of using social media marketing are [11]:

- Social media posts can be used to drive targeted traffic to a specific audience of people.
- Social media can act as a very useful tool for boosting the business site's SEO. The traffic building on social media pages of one's business will help their websites get better search engine results.
- Social media may help to build real producer consumer relationship as the tweets on Twitter and posts on Facebook get an insight into the daily lives of their customers and thus help them build better marketing strategies.
- While maximum users take, Twitter and Facebook as simple social networks and not as advertising and marketing platforms which makes them respond to one's business idea in a more open way.
- The most important advantage of using social media is the recognition of a brand, as the media itself becomes brand's content and voice.

The authors in the paper [12] identify the role of social media marketing in brand building and influencing consumer buying behavior while making a decision to buy a product. The authors carried out the study using primary data collected from 265 respondents through survey method using structured questionnaire. The authors used convenient Sampling and the findings of the paper highlighted the utility of social media marketing in building brands.

In paper [1], the authors investigated 504 Facebook users in order to find out the effect of firm-created and user-generated social media communication on brand equity and brand attitude by conducting a survey throughout Poland.

The author in paper [2] gave a detailed description about social media marketing and its advantages. The author also explained as to why to use social media market in libraries and also put forward various challenges of using social media in libraries.

In paper [11], the authors carried out an empirical research to recognize the effectiveness of social media as a marketing tool and analyzed the influence of social media on consumers in buying decision making. The claims of the authors were supported by various statistical tests. The authors also suggested that effective and innovative strategies need to be designed for winning larger share of business through this revolutionary medium of social networking.

In paper [15], the authors analyzed the usefulness of existing lexical resources as well as features that apprehended the information about the informal and creative language used in Twitter.

3. Proposed work

This section of the report consists of defining the problem statement and giving the research objectives of our project.

3.1. Problem statement

The effect of social media on the company's reputation and the brand building of its products needs to be studied in order to predict the marketing and distribution plan of its products before their launch. The posts on social networking sites further could be evaluated to get the feedback of their customers on its products that are already in market.

3.2. Research objectives

Based on the motivation and problem statement, we have defined the following research objectives for the project:

- Investigating the correlation between worldwide sales made by @SamsungMobile and their followers on twitter over past five years (2011-2016).
- Understanding the impact of E-Marketing on various geographical regions by analyzing the spatial distribution of @SamsungMobile Twitter followers.
- To study the brand building achieved through Twitter by analyzing the marketing outreach of @Samsung Mobile (i.e. average visibility of tweets made by @Samsung Mobile).
- To conduct sentiment analysis of the tweets made by general masses about @Samsung Mobile and its products, thereby, gauging the inclination of its customers towards their products.

4. Research methodology

This chapter provides an overview of methodology adopted to attain our research objectives. The chapter starts with a reason behind choosing Twitter as the platform for conducting our study. The sections succeed with a brief description of sampling process used for collecting the twitter data followed by the description of tool used for analyzing same.

4.1. Why twitter?

Twitter is excellent for obtaining data for research as it creates an automatic database of information in real time, which signifies that as the data is archived it will become a unique source of historical information. People tend to give their opinion on latest trends, politics, society, news and technologies in market on Twitter in form of tweets whereas on other major social networking sites such as Facebook, Youtube and Instagram people tend to express their views more often in the form of photographs and videos which are difficult to analyze. That makes Twitter much more convenient option for analyzing the social media data. Moreover, the data available on Twitter can be easily accessed through its API.

4.2. Sampling process

Everyday almost 500 million tweets are made on Twitter which makes it virtually impossible to study all of them. So, Sampling becomes inevitable. In order to carry out our research, we have used Convenience Sampling, wherein, units are sampled because they are convenient to obtain. In our case, we relied on the tweets gathered from Twitter API through NodeXL.

4.3. Node XL

NodeXL is a set of already built class libraries using a custom Windows Presentation Foundation control. NodeXL gives users the permission to collect, analyze, and visualize a variety of networks thereby providing easy access to social media network data streams. NodeXL also allows for quick collection of social media data using a set of import tools that can collect data of network from various social networking sites like Twitter, Flickr, and YouTube. NodeXL fits into Microsoft Excel 2007, 2010, 2013 and 2016 and opens as a workbook with a variety of worksheets containing the elements of a graph structure such as edges and nodes [13].

5. Results and analysis

In this section, the evaluation of the tweets and study of the geographical locations of the followers is carried out to fulfil the objectives specified.

5.1. Samsung smartphone sales v/s @samsung mobile followers on twitter

To investigate the correlation between sales made by @Samsung Mobile and their followers on Twitter, i.e. the first objective of our research, we analysed the sales and revenue data alongside the twitter follower history of @Samsung Mobile, which is the official twitter handle. The sales and revenue data was gathered from annual reports published by Samsung from time to time and various other online statistics, market research and business intelligence portals such as Statista.

Table 1: Quarterly Sales of Samsung Mobiles and No. of Followers (2011-2016)

Quarters	Units Sold (In Millions)	Followers
Q2 '11	18.4	127924
Q3 '11	28.1	245184
Q4 '11	36.2	431859
Q1 '12	44.	779478
Q2 '12	50.3	1180801
Q3 '12	56.3	1547256
Q4 '12	63.7	2016347
Q1 '13	69.7	3189754
Q2 '13	77.3	4583518
Q3 '13	85.	5749723
Q4 '13	84.4	6825952
Q1 '14	88.5	8935627
Q2 '14	74.9	9217492
Q3 '14	79.6	9872519
Q4 '14	75.1	10032421
Q1 '15	82.4	10527923
Q2 '15	73.	10639755
Q3 '15	83.8	10831698
Q4 '15	81.7	10879843
Q1 '16	79.	10948289
Q2 '16	77.	11232176
Q3 '16	72.5	11423592
Q4 '16	77.5	12012738
Correlation coeff:	0.801337	

The twitter follower history of @Samsung Mobile was gathered from information available on internet sources like Social bakers. The Table I presents the quarterly sales data of @Samsung Mobile versus number of followers at that time.

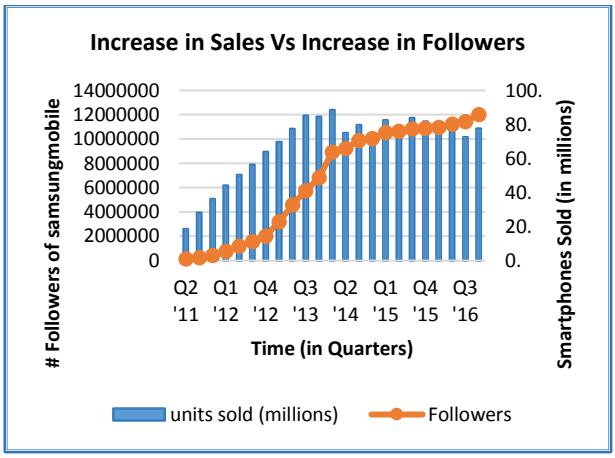


Fig. 2: Graph Showing Increase in Sales with No. of Followers.

From the graph shown in Figure II, it is clearly visible that the units sold is increasing with respect to the increasing followers. This can also be gauged by the correlation coefficient (0.8 app) which means that 80% of the variation is explained by the increase in followers.

5.2. Spatial distribution of @samsung mobile followers

To analyse the impact of social media/e-marketing done by @Samsung Mobile on various geographical regions, we took a sample [14] of 5000 @Samsung Mobile active followers and studied their spatial distribution across various continents. The analysis of spatial distribution of @Samsung Mobile followers reveal the continents where social media is most active.

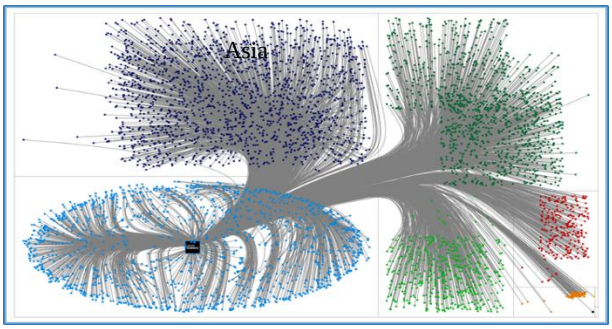


Fig. 3: Graph Showing the Spread of @Samsung Mobile Followers across Continents and their Mutual Connections.

The above graph in Figure III shows all 5000 followers grouped by continent and represented using Harel-Koren fast multi-scale layout [16]. The links shown in the above graph shows the connection between various followers and @Samsung Mobile.

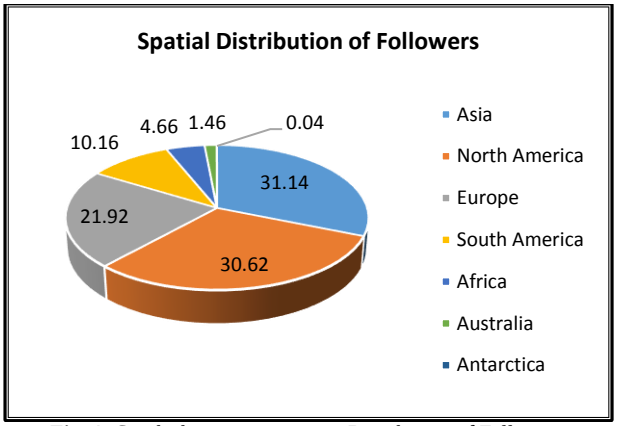


Fig. 4: Graph showing percentage Distribution of Followers.

The graph in Figure IV clearly depicts that Asian market leads with percentage of users actively using social media platform followed by North America. For testing the validity of the sample [14] distribution, we applied z-test with following null hypothesis (H0):

H0: 32 % of active users are from Asia i.e. p=32% or p=0.32

Ha: Active users from Asia are not 32%, p≠0.32

p=0.32, q=0.68, p'=0.3114, n=5000, α=10%

$$z = \frac{p'-p}{\sqrt{(p*\frac{q}{n})}} = -1.30363 \quad (1)$$

Since Ha is two-sided, we shall determine the rejection region by applying two tailed Z test at 10 % level of significance [α=10%].
|zα|>1.645
The observed value of |z| i.e. 1.30363 is less than critical value of z i.e. 1.645. Therefore, it is in acceptance region and as such, H0 is accepted.

5.3. Marketing outreach

To study the marketing outreach of @Samsung Mobile, we analysed the average extent of penetration of the tweets made by @Samsung Mobile across the twitter population. As on December 2016, @Samsung Mobile had approximately 12 million (12012738 to be exact) followers. Out of those, we took a sample [14] of 30200 followers and found that they had 336 followers on average; however, we are interested in population mean "μ" which can be estimated by following equation

$$\mu=\bar{X} \pm z\frac{\sigma_s}{\sqrt{n}} \quad (2)$$

Where, Sample size n=30200, Sample mean $\bar{X}$=336,

Standard Deviation $\sigma_s = 3004$α=5%, |zα|=1.96

μ=336±34

μ > 302

Therefore, the population mean is at least 302; at least 302 followers each further follow i.e. every follower of @Samsung Mobile. Furthermore, from this sample we inferred that every tweet by @Samsung Mobile is retweeted by 1302 followers. So total audience of a tweet made by @Samsung Mobile can be calculated as:

12012738+1302*302 =12,405,942

Therefore, it can be inferred that tweet made by @Samsung Mobile is visible to approximately 12.4 million twitter users. This figure becomes even more interesting when we think of the cost involved in spreading awareness about any product using tweets (e-marketing) as opposed to the amount of money that would be required for spreading awareness to same amount of people using conventional methods like advertisements, sponsorships, flyers etc.

5.4. Sentiment analysis

In order to find out the inclination of the customers of @Samsung-Mobile towards their products, we conducted a sentiment analysis on a sample [14] of 7740 tweets using NodeXL tool regarding the Smartphones (Samsung A5, A7, JSeries, C9, On 7, On Nxt, On 5, On 8, S7, S7 Edge, S8) launched by Samsung in last one year and statistics shown in Table II were observed. From the results of sentiment analysis shown in Table II, the following observations were made:

- Out of 7740, approximately 75% of the tweets were neutral, i.e. there were no positive or negative comments regarding the products under consideration.
- Of the remaining 25% of the tweets, approximately 68% of the tweets carried positive sentiment/feedback with respect to the products under consideration. These statistics clearly signifies the vital role played by e-marketing in building brand names and spreading the awareness about the products.
- The analysis also showed that 1.5% of the tweets made by the general masses were regarding the purchase of the specified products which justifies the above observations that people not only get aware of the products but are influenced enough to buy them and share their experiences on the same platform.

Table 2: Sentiment Analysis of the Tweets on @Samsung Mobile

Phone Model	Tweets with +ve Sentiment	Tweets with –ve Sentiment	Tweets depicting Buying Behaviour	Total Tweets
A5	71	15	1	326
A7	31	6	2	100
C9	17	6	0	79
J Series	669	444	53	5554
J1	25	5	1	79
J2	8	0	0	78
J3	32	0	0	66
J5	9	0	1	89
J7	21	9	0	97
On 7	177	127	51	512
On Nxt	13	7	2	51
On 5	29	10	2	76
On 8	48	7	2	71
S7	44	15	0	0
S7 Edge	39	7	1	1
S8	72	18	4	4

6. Threats to validity

Following are some of the major points that could make our research project vulnerable to some questions:

- The method used for sampling i.e. Convenience Sampling can introduce sampling errors thereby; exactly same results may not be achieved for a different sample.
- Some of the data points regarding follower history of @Samsung Mobile has been calculated using interpolation.
- Due to the data rate limiting policy imposed by Twitter on its public API, analysis could only be made on recent tweets and not on historic data.

7. Conclusion and future scope

In this project, we performed an analysis on Twitter data of @Samsung Mobile available from public twitters API to study the impact of tweets related to @Samsung Mobile on its brand building, customer satisfaction of @Samsung Mobile products and its sales per quarter. The findings and the results of our study clearly signifies that social media marketing influences the building of brands as well as influence the sales of the business. Moreover, the feedback obtained from the customers in form of tweets about their products further help to design the marketing strategy of their products.
This project can be further enhanced to fetch similar findings and deductions for the other brands besides @Samsung Mobile. Also, the data on which the analysis has been done in this study is recent data, so, the project could be enhanced to do a detailed study on previous years data in order to see the pattern and trends that has been evolved with respect to consumer behaviour.

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