

A Brief Review on Impact of Social Network Mining on Online Shopping for Classifying Customers

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DOI: <https://doi.org/10.26438/ijcse/v7i7.8792> | Available online at: www.ijcseonline.org

Accepted: 10/Jul/2019, Published: 31/Jul/2019

Abstract: Communication is the only way to exchange views and feelings. If communication between two parties is strong, there must always be more trust and decisions are taken firmly. Social networking sites are the potential tools which are utilized for communication without much physical efforts. Nowadays, the Social Networking phenomenon is spread over the globe and affects every individual who uses a social medium to communicate with others. Social networking sites have revolutionized the way companies communicate with their customers. The reachability of companies to customers has drastically improved because of the revolution in mobile technology. The main goal of our work is to get the insight into the impact of social networking on customer behavior, to explain why, when, and how social media has impacted on the customer decision process. We briefly introduce various laws used in mining techniques and the concept of link analysis used for analyzing the data gathered from social networking sites. We explain the concept of centrality in social networks and exponential growth in online shopping and the causes behind this trend are also analyzed as well.

Keywords —Social Network Mining, E-commerce, Web Mining, Customer Behavior, Six Degree Separation

I. INTRODUCTION

Social networks are the groups of people who are connected amongst themselves using some relation, i.e., blood relation, friendship, classmates, colleagues, and others [1][2]. These groups are used to spread and collect information, which is used to make decisions. There are versatile of members in a group influencing others to follow their steps, whether it is music, reading, or shopping [3][4]. In the case of shopping, we collect information from our known ones before purchasing the product [5][6]. In this way, our purchasing behavior is governed by others with realization [7]. Retail shops have the facility of shopkeepers who describe the features of products before they are purchased. We seek the opinion of our friends before buying any new product. We share the product quality within our social network to affect their positive or negative sales [8].

Since Internet has become an essential part of everyone's life and Facebook, Twitter, WhatsApp, Instagram are the online social networking platform connecting us 24*7, we get influenced by the information shared on those platforms. Now when social networks are online, E-commerce sites, such as Flipkart, Amazon, Myntra, and eBay have successfully integrated advertisements with Online Social Media. Online reviews have occupied the place of 'words of mouth'. Any customer can review, recommendation, search, and compare the products. Various sites like Trivago,

BizRate provide a platform to customers compare the products, crack the best deal [9].

As our behavioral psychology drives us to trust our friends' decisions, Facebook and other social networking sites bombard the advertisements of the products which have been bought or recommended by our Facebook friends. Cashback policy and discounts on purchase hit the bull's eye, as they keep increasing the number of customers with their lucrative strategic offers. In this paper, we try to review all the mechanisms used for expanding the customer base and classifying them differently using their online social networks.

Rest of the paper is organized as follows: Section II contains a framework of review, In Section III, details of related work have been given and various categories of customers according to country, product and age are described. Finally, Section IV concludes the paper.

II. FRAMEWORK OF REVIEW

In online shopping, there are three main entities, Customer, Social Media, and E-commerce companies. Customer is the prospect to which any e-commerce company wants to reach through Social media. Once a customer becomes loyal to that company, he/she can behave as an advertiser and can diffuse the messages from the company through online social networking sites. According to the phenomenon of

‘six degree of separation’[10], two customers are linked by maximum six steps, i.e. a chain of ‘a friend of a friend’ helps e-commerce sites to propagate their messages to the entire network [11]. So, in a way, social networking sites are the

platforms which provide their services to both, the customers and the companies. We can depict this scenario using figure 1.

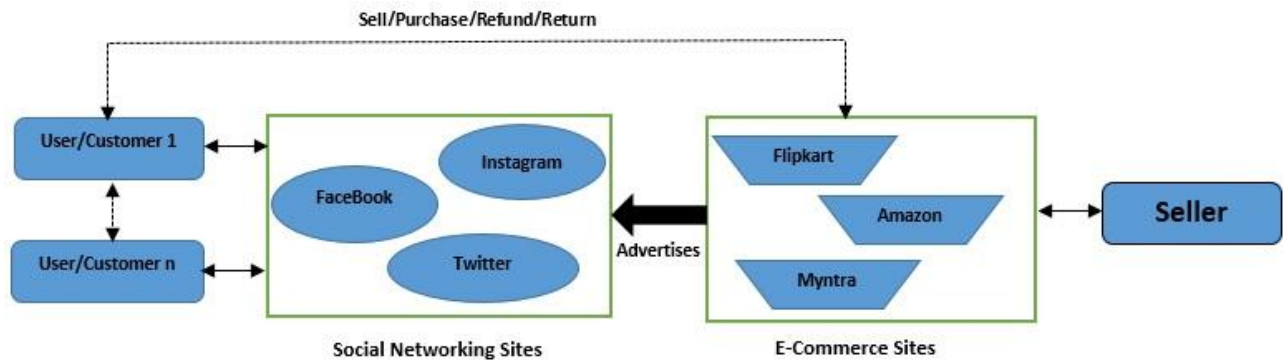


Figure 1: Online Shopping Scenario

Social networking sites provide transparency and accessibility of information to the customer, which ultimately converts into positive marketing and decision making becomes easier. According to a study, there are around 1.5 billion active users on social networking sites. From the study, it is observed that social network recommendations influence 23% of online customers. Out of all the online customers, 30% of them wish to purchase from social network sites like Facebook, Snapchat etc. rather than purchasing from e-commerce websites. It is observed that approximately 85% of the customers go through the reviews before buying a new product.

Social networking sites are platforms which play a vital role in giving and receiving information globally. In social networking sites, the information flow is bidirectional. This information flow guides e-commerce sites to target their potential customers. One can search for available alternatives by comparing various sites on the same platform and take decisions accordingly. More reliability on social media can cause misunderstanding and misinterpretation [12]. So it is essential for a customer to make such decisions which are beneficial for him.

III. LITERATURE REVIEW

Marketing on social networking sites is different from traditional marketing and more user-friendly. All social networking sites have different types of users [13]. Facebook is generally used for communicating with friends and sharing ideas, whereas WhatsApp provides a personal environment. LinkedIn is used by professionals, whereas Instagram is used basically for photo uploads. Similarly, YouTube has a different user base. Table 1 depicts a broader

picture of various social networking sites and the number of users linked with these sites.

Facebook: After its launch in 2004, with more than 2000 million users, Facebook has become the most reliable social networking site for online shopping, as 85% of the online shopping from such sites is done from Facebook alone, and the average value of the orders referred from Facebook is approximately \$55 [14].

Twitter: It started in 2006, with the intention that the users can find the people stream which is interesting for them. Rather than having a friendship bond, followers’ connection is used to spread the news. In the USA those posts which have photos are comparatively liked by 53% more people and comment rate increases by 104%. Short posts which have less than 80 characters are liked more with 66% high engagement. It is estimated that users referred from Twitter have \$46.29 average order value [15].

Table 1: Top Social Media Sites to consider for branding (Source: Buffer Marketing Library)

Company	MAU/MUV (in Millions)	Company	MAU/MUV (in Millions)
Facebook	2230 MAUs	Reddit	330 MAUs
YouTube	1900 MAUs	Baidu Tieba	300 MAUs
WhatsApp	1500 MAUs	LinkedIn	294 MAUs
Messenger	1300 MAUs	Viber	260 MAUs
WeChat	1060 MAUs	Snapchat	255 MAUs
Instagram	1000 MAUs	Pinterest	250 MAUs
QQ	861 MAUs	Line	203 MAUs
Tumblr	642 MUVs	Telegram	200 MAUs

Qzone	632 MAUs	Medium	60 MAUs
Tik Tok	500 MAUs	Google+	450 TUAs
Sina Weibo	392 MAUs	Flickr	115 TUAs
Twitter	335 MAUs	Quora	80 MUV
Vine	40 TUAs	Periscope	10 TUAs
BizSugar	NAN	StumbleUpon	25 TUAs
Delicious	5.3 TUAs	Digg	11 MAU

YouTube: Since its beginning in 2005, YouTube has now more than a billion users [16]. This number is approximately equal to one-third of internet users, and YouTube is accessed using mobile by almost 70% of its users. It is estimated that YouTube's referred users have over \$37.67 order value.

Almost all companies use YouTube videos for advertising their products.

LinkedIn: Since its launch in May 2003, LinkedIn has become the world's largest network for professionals having approximately 290 million users over the Internet [17]. According to LinkedIn, it supports 24 languages until 2017. More than 10 million companies have created their LinkedIn company pages and they pay to LinkedIn for advertising their goods and services. Various professionals share their job to advertise themselves in the market.

Flickr: Flickr was founded in 2004. Here, a user can share photos and host videos and send mails. It has a great

Table 2: Industry wise Market Leader Online Shopping Sites (Source: EWDC blog)

Industries	Industry wise Market Leaders Companies								
Apparel	Ajio	Club Factory	Flipkart	Jabong	Koovs	Limeroad	Myntra	Shein	Voonik
Electronics	Amazon	Ebay.in	Flipkart	Homeshop18	Infibeam	paytmMall	naaptol		
Footwear	Crocs	Jabong	Myntra	Club factory	Yepme	Zappos			
Food, Health & Beauty Supplements	amway	Bigbasket	Grofers	Herbalife	patanjaliayurved	Zopnow			
Jewellery	bluestone	Cilory	Craftsvilla	Kraftly	Voylla				
Fashion Accessories	craftsvilla	fashionandyou	Instyle	Limeroad	Mirraw	Shein	stylefiesta		
Toys & Games	firstcry	Hamgo	SnapDeal	ShopClues	Toywiz				
Kitchen & Home Furnishing	Amazon	Fabfurnish	Ikea	PaytmMall	Pepperfry	ShopClues	urbanladder		
Handicraft	craftsvilla	Etsy	Kraftly	Madeitmyself					

cataloguing and tagging mechanism for keeping the photo albums. It allows multiple photos of various sizes to be uploaded at a time. Flickr can be availed in 10 languages. According to Flickr's terms and conditions it cannot be used for advertisement purposes but there is an indirect way, i.e. if a company uses its site's address as their screen name of Flickr, then all its photos uploaded will have that screen name as attachment [18].

Instagram: With its initial release in 2010, Instagram has become one of the most popular social media [19]. Like Flickr, users can share their photos and videos, and companies can advertise their products by creating an account. According to a study, it is estimated that 75% of the users of Instagram take decisions to buy something after they look at the advertisements of companies' on Instagram. As many as 5 lac companies use Instagram for business purposes.

Table 2 summarizes the leading social networking companies used for advertisements for specific industries.

Classification of the reviewed literature

Internet is accessible everywhere and to everyone. Thus the online world is open for all. This boom has a history of only 20 years, but the humongous population growth is observed. So we can analyze the strategies with various diverse metrics. We have classified the study into several subparts like age-wise customer pattern, yearly sales, product wise sale, country wise purchasing and various mediums used for shopping and seasons affecting the purchase frequency.

i. Sales by Device

Mobile devices have brought revolution in the area of communication. Now M-shopping has superseded every other advertisement mechanism [20]. With the increase in mobile handset users because of technological advancement and it's portable nature, mobile shopping gives a customer-friendly environment. But still, PCs are used more than smartphones and tablets because of their reliability and security features. Tablets are less handy and used by professional only. Table 3 shows some of the statistics of online sale by various devices.

Table 3: E-commerce Traffic and Sales by Device

Device	Ecommerce Traffic %	Retail Sale %
PC	53.9	76.9
Smartphone	33.7	10.7
Tablet	12.4	12.4

ii. Age-wise sale

Customers of online shopping can be categorized by their age, gender, demography, and various other reasons. In [21], all these factors have been analyzed to find customer behavior. Since youth is more gadget-friendly and old customers don't want to breach their loyalty towards their regular sellers, the trend keeps changing with the age. Table 4 depicts the scenario, where people of the age group 30-39 have highest purchasing frequency because they are young and economical more stable than the age group 18-29.

Table 4: Age wise online shopping frequency

Age Groups	Frequent (once a week) %	Occasional (Once a month) %	Infrequent (once a year) %
18-29	35	41	24
30-39	37	35	28
40-49	23	35	42
50-64	17	38	45
65+	11	31	58

iii. Country-wise Sale

Amazon is a 25-year-old company, and after completing 25 successful years in the online shopping business, it has given some important statistics related to country-wise online shopping [22]. India leads the list with 88%. This list is shown in figure 2.

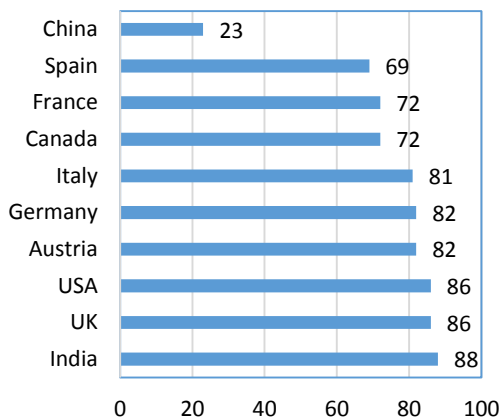


Figure 2: % adults ordered from amazon in last 1 year (Source- statista.com)

iv. Yearly sale patterns

The number of internet users is increasing day by day, and so is the number of online buyers. In the year 2014, only 42% of the Internet population was purchasing online, which is raised to 47% in 2018. If converted into numbers, it's in billions. A complete list of worldwide shopping trend is given in table 5.

Table 5: Worldwide digital buyers

Year	% of internet Population
2014	42.7
2015	44.3
2016	45.4
2017	46.4
2018	47.3

v. Product wise sale

We can categorize the industries into the following parts:

Electronic Items: Electronic items are the most searched items on social media. Mobile phones to the list, and then there is a list of laptops, pen drives, power banks, digital cameras, and many more. Amazon and Flipkart sold more than 5 million smartphones between the years 2016-2018 only in India. This demand is increasing with the advancement of technologies.

Apparels: According to Google reports, though electronic products are most searched, apparels and fashion accessories are the clear winners in terms of purchasing [23]. The impact of fashion is remarkable amongst youth; online stores provide lucrative discounts and target each section separately. It is estimated that by 2020, India will generate a total \$100 billion revenue from fashion, out of which \$35 billion will be from Apparels only.

Household Products: Kitchen items, food, and other household items are high on-demand on social media. Various weight loss products, detoxing items, green tea, etc. have become popular because of online grocery stores. The demand for home decor items and kitchen gadgets is increasing 6-7% per year from online sources.

Movies: Many of the movies are released on the Internet and with this, piracy is reduced. Many web series and recently released movies are available, and we can watch them by paying the price. This has become a trend of the film industry to promote their new releases by appearing on electronic media and the Internet.

Games: Today's kids are exposed to mobile and the Internet, so their obvious demands are games on mobile. Various basic and popular video games can be purchased online. Figure 3 depicts the entire scenario using a pie chart.

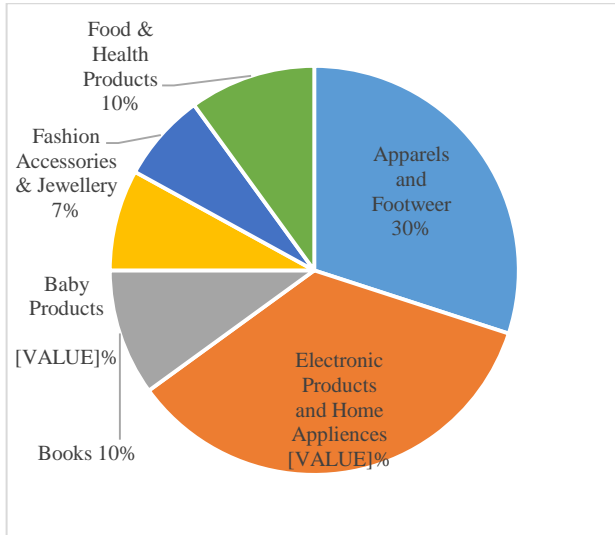


Figure 3: Annual online sale of Products (%)

vi. Seasonal effects

In India, festivals are celebrated throughout the year. And every festival is made a big occasion by e-commerce companies as well [24]. In [25], online sales of Flipkart and Amazon have been analyzed. Figure 4 shows the trend of an increasing number of customers with every next year. Amazon's Great India Sale and Flipkart's Big Billion days are the most popular sale seasons.

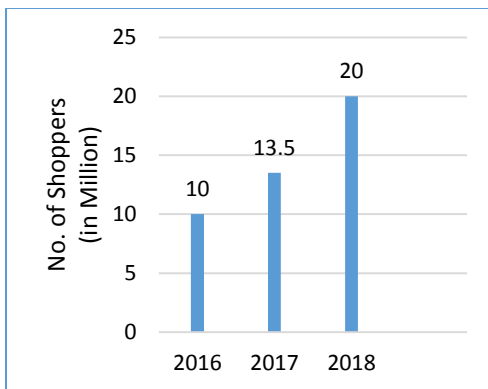


Figure 4: Online Diwali Sale (Source-statista.com)

Various Laws governing Social Networking Scenario

Many of the theories developed for network management can be applied to social networking as well. Three important theories are briefed here.

Sarnoff's Law: The law says, number of listeners on a network is used to find its value [26]. If the number of listeners increases, so will be the value of reachability of network. For social network scenario, we can associate the number of liable customers to a brand, i.e., more number of customers means higher brand value.

Metcalf's Law: A little variation with the Sarnoff's law, this law associates the number of users with the value for the community [27]. In the social networking scenario, if a new user is added to the network, the value of the user's profile is increased [28].

Reed's Law: This law talks about supporting groups of users [26]. If there is a closely knitted group of users, their communication would be strong, and information would be relevant.

Social Network Centrality and its impact on information diffusion

As the previous laws suggest, the network's structure and the central node of that network defines how quick the information can be diffused throughout the network. Centrality can be viewed in nodes or edges [29]. A central node would be the node situated in the center of the network. It may be degree centrality (node having the highest degree), closeness centrality (average of distances of the central node to all other nodes be minimum) or betweenness centrality (maximum traversed node used as a bridge for finding the shortest path between all the nodes). We can use edge centrality for the same purpose. If any message is given to the central node, the chances of quick diffusion of the message would always be higher [30]. In Facebook, a person having more number of friends has a larger network. On Twitter or Instagram, a user having more followers has more power to spread news, which might have commercial or any other information. E-commerce companies target those networks which have a high liking for their products. This can be traced easily by users' previous history.

IV. CONCLUSION

In this paper, we have seen the increasing trend of online shopping with multiple options available on a single click and at the best price. So we can call the social networking sites as marketing tools. But this environment seems to be uncontrolled, and there is a need for more robust strategies for social media. The comments and reviews of previous customers help a new one, but they need to be incorporated in the companies which sell the products. Return and refund issues are also a bit fussy in online shopping. So we can summarize that social media needs to be improved with the help of traditional mediums like electronic and print media. This will ultimately reflect a huge shift from traditional marketing to social media advertisement and increase the potential of online shopping.

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