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Dear Researchers and Readers,

On behalf of the management and the editorial team at Rizvi Institute of Management Studies & Research, it gives me immense pleasure to present the latest edition of Management Vision.

As has been the case with all our previous editions, we have always believed in the quality of research papers over quantum. Keeping in line with our philosophy of quality research publications this edition serves the purpose of enriching the readers with diverse and contemporary issues in management.

The institute firmly believes in the philosophy of Customer Centricity in all aspects of its functioning and this research publication is no exception. Our customer centric approach to this publication is thus to have research papers that add value to the reader and not only generate interest for the next edition but also drive the reader towards meaningful research. It is with this onus the research papers are scrutinized and published.

Management Vision is our humble attempt to expand the horizons for a better and enriched view of management perspectives. It is a platform for researchers across domains in management to put forth their attempt to widen the vision through their research and perspective.

We would like to thank all researchers, past and present who have contributed to Management Vision and made this endeavor of research publications a continual successful venture.

Thanking you once again. Happy Reading. Happy Researching.

Dr. Kalim Khan

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GUIDELINES

Detailed Guidelines on Submitting Research Papers

Is there a First among Equals in Social Media Platforms for Millennials? An empirical study

Tapish Panwar¹

Abstract

Rise of social media has forced marketers to adopt this medium of marketing with the tinted glass of how traditional marketing was done. The result is the proliferation of the social media marketing without a definitive strategy. A generalized approach would distribute efforts in a non-rational way among the available platforms of social media, diluting the effectiveness of the marketing efforts. In absence of a clear understanding of consumer preference towards individual social media platforms, the social media efforts end up being distributed in an inefficient manner. This paper looks at different social media platforms relevant in the Indian context, and how they fare in terms of adoption and engagement with millennials. It is established with the help of a representative consumer research, that there is a clear preference for specific social media channels when it comes to catering specific needs and motivations of users. Practitioners and marketing managers would find it helpful to target the right social media platforms for their respective marketing objectives, based on the platform preferences unearthed in this paper.

Keywords – *Social Media, Digital Marketing, Social Media Marketing, Social Media Marketing Effectiveness, Return on Marketing Investments (JEL:M31)*

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1.0 Introduction

One of the major challenges which Marketing Managers across the world face today is, to quantify the results of the marketing efforts in terms of time, labour and money. While the medium of advertising has changed over the century from mass to internet and now to personal, the challenges for these managers have remained as is. With the advent of Social Media Marketing, the era of highly personalized and targeted communication began, which made life of the publishers and advertisers much easy. However, the challenge related to expending of resources against measured and specific target remained.

Social Media Marketing has grown by leaps and bounds in last decade riding on internet revolution and proliferation of smartphones and connected devices. About 52% of the world is connected to internet now. India in particular has shown astonishing growth rates when it comes to internet penetration. India added a whopping 108 million internet users to take its internet user base to 462 million. Social media has been a key to this growth as internet users largely hop on the internet bandwagon to get online on social media. India has more than 260 million people on social media². This huge congregation of users on social media made it “must-be-there” place for marketers from all product categories and brands. One cannot afford to have no presence on the social channels if the competitor is making waves with its products and services. Companies have been trying to remain in the consideration set of its target users by being ubiquitous on all social media platforms. Irrespective of the product category, core benefit and target segment, there has been a generic attempt by companies to be on multiple channels of social media. This is more due to ‘Fear of Missing Out’ (FoMA) and less based on due-diligence and scientific rationale. A major criteria for example, before choosing the platform on which you want to market, is the reach and engagement of that media platform with the target audience. The trend in the western markets has clearly shown a declining popularity towards Facebook and a rising inclination towards the newer visual heavy platforms like Snapchat and Instagram³. However, it is important to ascertain this in the Indian parlance. Indian customers are different in many ways, from behavioral to social and technological to economic aspects. So has the trend that caught up the western world found takers in Indian set up?

Is youth in India also conveniently moving towards the visual heavy platforms from the now ‘octogenarian’ Facebook or Facebook has a lot of juice left in it in the Indian market? Is the level of engagement (in terms of preference) that youth has, for various social media platforms significantly different?

² <https://www.techinasia.com/india-462-million-internet-users-79-traffic-mobile> (referred as on 16th November 2017)

³ <https://www.nytimes.com/2017/04/26/technology/why-instagram-is-becoming-facebooks-next-facebook.html> (referred as on 19th November 2017)

Further sections of this paper discuss the advent of social media in detail. Additionally, the paper analyses data from primary research to see the awareness, reach and usage behaviour of the Target Audience for various social media platforms.

2.0 Motivation

Marketing Managers are required to justify the returns on their marketing spends⁴⁵. It is challenging because it is not easy to attribute every unit sold to the specific marketing activity or a campaign. Marketing on social media is often considered to be a ‘has to be’ activity but with a ‘me too’ attitude rather than creating actual value out of it. This is even more ironical as social media, unlike traditional media, has better ways to slice customer segments and hence target the right audience at the right time. Multiple reasons can be attributed to this behaviour of social media marketing:

- Lack of understanding of the core benefits that each social media channel offers to its target audience, or worse, assuming a generic benefit to the TG (Target Group)
- Inability to create sub-segments among the customer groups for more specific targeting, or incorrect choice of customer segments for targeting
- Relative inexpensive expenditure that social media marketing requires builds over the myth “more is better”

This paper does its bit to understand the level of reach and engagement that various social media platforms are having with the users. This would ultimately help companies channel their social media efforts, time, labour and money in the right direction with right intensity.

3.0 Objectives

This paper looks at the reach and usage of various social media platforms among youth. It would help marketers understand which social media platforms are more relevant based on their acceptance and adoption by the youth. This paper would also help marketers extend the findings to consolidate their effort, money and time for the right channels in the most effective way, thus improving their net Return on Social Media Marketing (RSMM). The specific objectives are:

- To study the growth of social media globally as well as in India
- To study the reach (adoption) of various social media platforms among youth
- To understand if there is a clear preference among the youth for various social media platform for various motivation triggers

⁴ <https://trackmaven.com/blog/justify-your-marketing-budget/> (referred as on 18th November 2017)

⁵ <https://www.forbes.com/sites/christinemoorman/2018/03/21/social-media-spending-use-and-distraction/#6be16d2279cd> (referred as on 18th November 2017)

4.0 Literature Review

(Arca, 2012) in her paper 'Social Media Marketing Benefits for the Business', concluded that the benefits a brand can accrue by being on Social Media vary in terms of value and volume. She pointed out that generally the brands can expect various benefits out of presence on social media like increased brand exposure, reputation management, increased targeted traffic and higher ranking in Search Engine Optimization. She also argued that while Social Media Marketing is a cost-effective solution, the choice of channel is of critical importance.

The author (Anne Whiting, 2014) argued that social media marketing cannot be loosely held strategy of any company. While a lot of social media related efforts must be thought in isolation to kill any bias towards the audience and ways to influence consumer perceptions, it also needs to be tightly integrated in terms of execution and synergy with the marketing strategy otherwise.

(Andreas M. Kaplan, 2010) suggested that if the firms are not present on Facebook, YouTube, and Second Life, they are not part of the cyber space. He argued that Social Media harbors engagement within customers and companies which are often timely and more effective at lower costs. This makes Social Media relevant for all firms, big and small.

In his paper, (W. Glynn Mangold, 2009) argued that social media is a hybrid element of the promotion mix of marketing. Social media enable companies to talk to the customers the traditional way, but it also enables the customers to talk with the company and within themselves, which was not present in the traditional way of communication. This helps in giving insights to the marketers about the controlled but necessary use of social media to reach out and influence the right target audience for the brands.

In their research, (Boujena, Godey, Manthiou, Rokka, & Ulrich) showed a significant impact on the brand due to social media activities that users engaged in. They went on to suggest that consumers brand perception depends upon the consumer social media activities related to that brand. Also the link between the two is moderated by factors like congruence of company's social media presence across various channels, brands relevance in social media from a consumer point of view, and also consumer's motivational orientation towards the brand.

The author, (Paquette, 2013) sums up in her paper review that social media creates new opportunities for small retailers by providing them endless opportunities to reach out to their customers and almost putting them on the same pedestal with the big retailers. She also cites this as one of the main reasons why more study on the impact of social media on marketing must be taken up.

While there has been much work in the area of asserting importance of social media, few researches are also done highlighting how it is even more critical to choose the implementation carefully based on multiple, but generic rules⁶. There is still scope for work to be done on the specific reach of various social media channels in youth and hence, there is no conclusive report that suggests or ranks the social media platforms in terms of their reach and interest of the young population in India, specifically urban cities and metros including. As a first step to bridging this gap of knowledge, this paper attempts to detail the current state of social media penetration and usage in India. The paper further studies the reasoning and rationale for the use of particular social media platforms and what do consumers engage these platforms with for?

5.0 Theoretical Background

5.1 What is Social Media

According to (Evans, Social Media Marketing - An hour a day, 2010) social media is the democratization of information that transformed content readers into a content publisher. Rightly so, the users who for long were passive receivers of information have actively become content creators distributors.

The basis of creation of content mutual interest, thoughts and individual experiences that are all well buttressed by the empowerment of each and every user on the social web. To put it simply Social Media is a set of channels that allow people to communicate with each other over the internet. The communication elements are text, pictures, videos and a combination of all of these. Some experts have also put social media as the super category of other sub-categories like social networking, social news, social bookmarking, wikis, blogs and private web messaging⁷.

5.2 Social Media Marketing

Social media marketing is marketing products, services, people, events, places or even ideas through social media. It helps in creating awareness and build communities around the brands, while also create networks that are rewarding for the brand and the company in short and long term. The very nature of communication between the companies and the consumers has changed, courtesy social media, and social media marketing hence has become an important discipline for the brands to be relevant and present. The interaction has changed in two specific ways aided by social media –

- From a one-way communication, from the company or brand to the customer, it has changed to an interactive communication where customers are freely voicing their feedback and concerns on social media.

⁶ <https://mashable.com/2010/01/18/social-media-not-for-everyone/> (referred as on 19th November 2017)

⁷ <https://www.lifewire.com/what-is-social-media-explaining-the-big-trend-3486616> (referred as on 16th November 2017)

- The major part of communication about a particular brand or a company is between the customers who talk about it and exchange views about the same on the social media with no control of the companies or the brands in question.

An interesting aspect about the social media marketing as highlighted by Ivana Taylor in her paper ‘Why Social Media should be a key ingredient in your Marketing Mix’, is that when a brand or a company tries and brings together people around a common interest, it increases the brand’s credibility and builds the brand’s image which in future may lead to increase in profitability by creating a loyal customer base⁸.

5.3 Social Media Channels

Social media is a set of channels that act as a medium for users to come together and interact with each other, communities and brands. These channels can be categorized into multiple segments which are given as follows:

- As per (Arca, 2012) the social media channels can be categorized into seven important segments which include Social Networking, Blogging, Sharing Sites, Collaborative Sites, Book Marking, Forums and Social Events sites. However, these segregations are on discretion and do not represent any formal authority.
- A document released by the Government of Prince Edward Island (P.E.I Govt.) for informational purposes on social media and its business usage segments these channels in a similar way with a special mention on Business Networking and Wikis. (P.E.I., 2017).

While the channels mentioned in the above two sources are relevant for the global population, many of these channels are not much relevant in the Indian context due to their miniscule penetration among the social media users⁹. Also, specific to the marketing ability on these channels, below are the social medial channels which are more relevant in Indian context.

- **Social Networking:** Websites or apps that allow users to network with people through sharing of information, messages, pictures and videos. Example- Facebook and Google+
- **Messaging Applications:** These are light apps that allow users to chat with other users and groups. Users can also share pictures, audios and videos with other Example – WhatsApp, Facebook Messenger and Snapchat
- **Business Networking:** Unlike personal networks, these channels are used for professional purposes like business networking and jobs. Example-LinkedIn.

⁸ <https://smallbiztrends.com/2008/05/social-media-key-to-marketing-mix.html> (referred as on 16th November 2017)

⁹ <https://smallbiztrends.com/2016/05/popular-social-media-sites.html> (referred as on 17th November 2017)

- **Blogging and Microblogging:** These websites/apps allow users to post a mix of information, pictures and short snippets of videos for others users to read and comment. Example- Blogging: BlogSpot, WordPress; Microblogging: Twitter
- **Photo Sharing:** Allows users to share pictures with the public or private network. Example- Pinterest and Instagram
- **Video Sharing:** These apps/websites let the users share video content with other users. Example-YouTube
- **Presentation Sharing:** These platforms allow users to share their presentation to the public or a set of users based on preference. Example - SlideShare
- **Collaborative Sites:** These sites allow collaborative engagement between users to update and manage the content of pages of the site. Example-Wikipedia, Quora
- **Ratings and Review:** Users can rate and give feedback for services and products on these websites which create a knowledge pool about the brands and companies that can be accessed by prospective customers. Example-TripAdvisor

5.4 Social Media Facts

5.4.1 Global Perspective

The importance and rise of social media in various walks of life cannot be overstated. The growth of social media channels and the penetration level that has been achieved has been phenomenal. Digital media overtook television in terms of daily viewing. Figure 1 from Statista¹⁰ throws some light on the aforesaid.

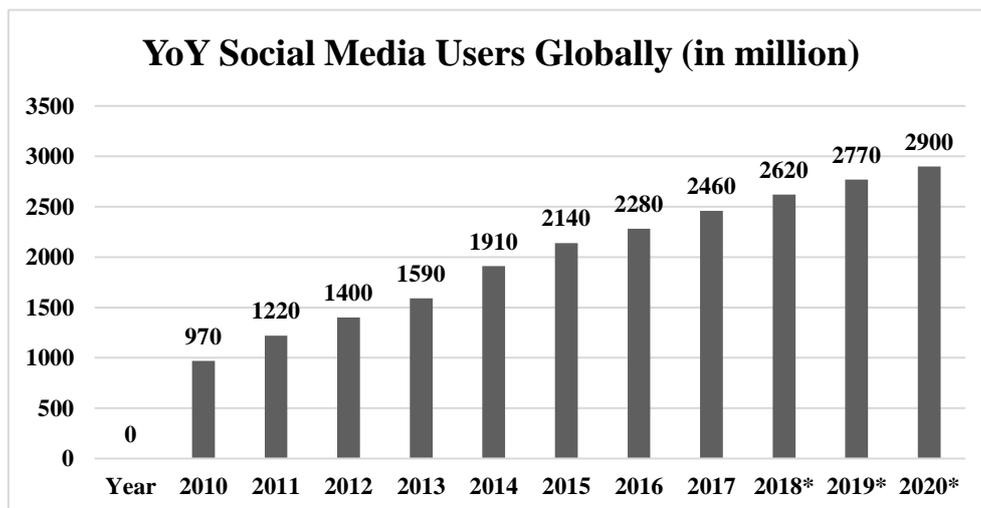


Figure 1: Social Media Users Globally in millions (Source: Statista)

¹⁰ <https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/> (referred as on 17th November 2017)

In the year 2017, 71 percent of all internet users were social network users. Social networking, by the virtue of being high engagement activity is one of the most popular online activities. This high growth in the user base of social media is largely supported by the expansion of worldwide usage of smartphones and mobile devices. This is especially supported by the fact that most social networks have been either made available mobile apps or have been optimized for mobile internet browsing. Figure 2, (Data from Statista)¹¹ shows the user base of social media channels across the globe as of September 2017.

5.4.2 Indian Perspective

India has more than 450 million internet users which translates to an internet penetration figure of about 35%. This figure is much lower than the global average of internet penetration that stands at more than 51%.¹²

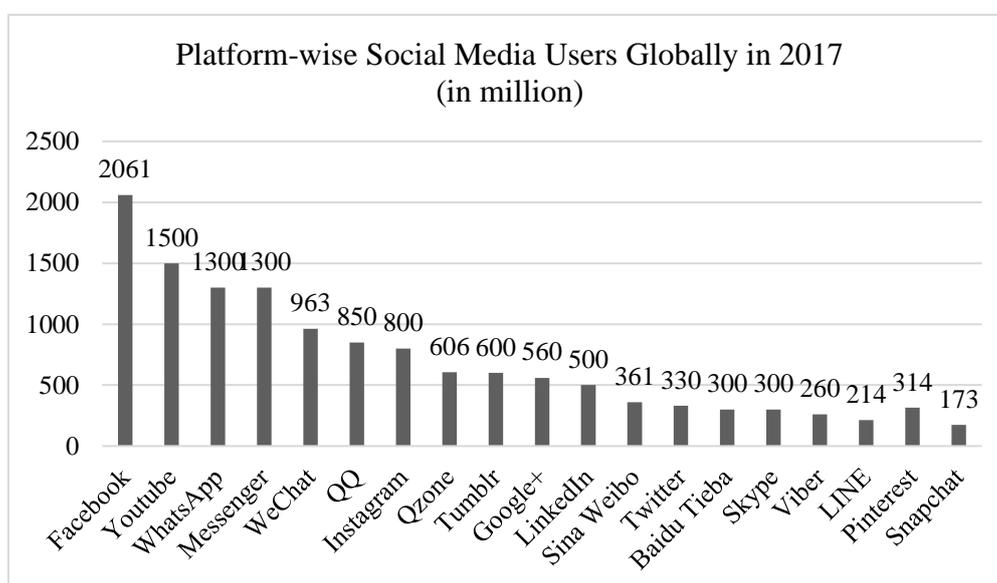


Figure 2: Platform-wise Social Media Users Globally (in million) (Source: Statista)

India is home to about 260 million social media users most of which are present on Facebook. The social media user base has been steadily growing and has reached to about 260 million users by 2017, which, while in absolute number is one of the highest figures in the world, but in penetration percentage, is only about 20%.

Also, more than half of the Facebook users in India are below 25 years of age¹³. This is about 46% of all the users that are online in India. Facebook is the biggest social media channel with about 260 million users, which also makes the country its biggest user base in the world.

¹¹ <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/> (Referred as on 17th November 2017)

¹² <http://www.internetworldstats.com/stats3.htm#asia> (referred as on 19th November 2017)

¹³ <http://www.livemint.com/Consumer/CyEKdaltF64YycZsU72oEK/Indians-largest-audience-country-for-Facebook-Report.html> (Referred on 19th November 2017)

Google’s video sharing platform YouTube has a 200 million plus user base, while WhatsApp boasts a user base of 200 million which is also the biggest in the world. LinkedIn with its 45 million users and Twitter with its user base of about 23 million users¹⁴ are other important social networks in India. Picture sharing network, Instagram, too has become really popular in the country with about 33 million users. Figure 3 represents a number of internet users, social media users and users on various social media channels. The line represents the percentage of global users that India has in all these categories.

There is no doubt that social media is a critical channel for marketing these days while its relevance varies from high to low from one product category to another. Also, while these astonishing growth figures do represent a rise of social media as a platform in the country, there is little evidence on the efficacy of these social media channels with respect to the influence a brand may exert on its prospective customer based on a number of social media channels it is present on.

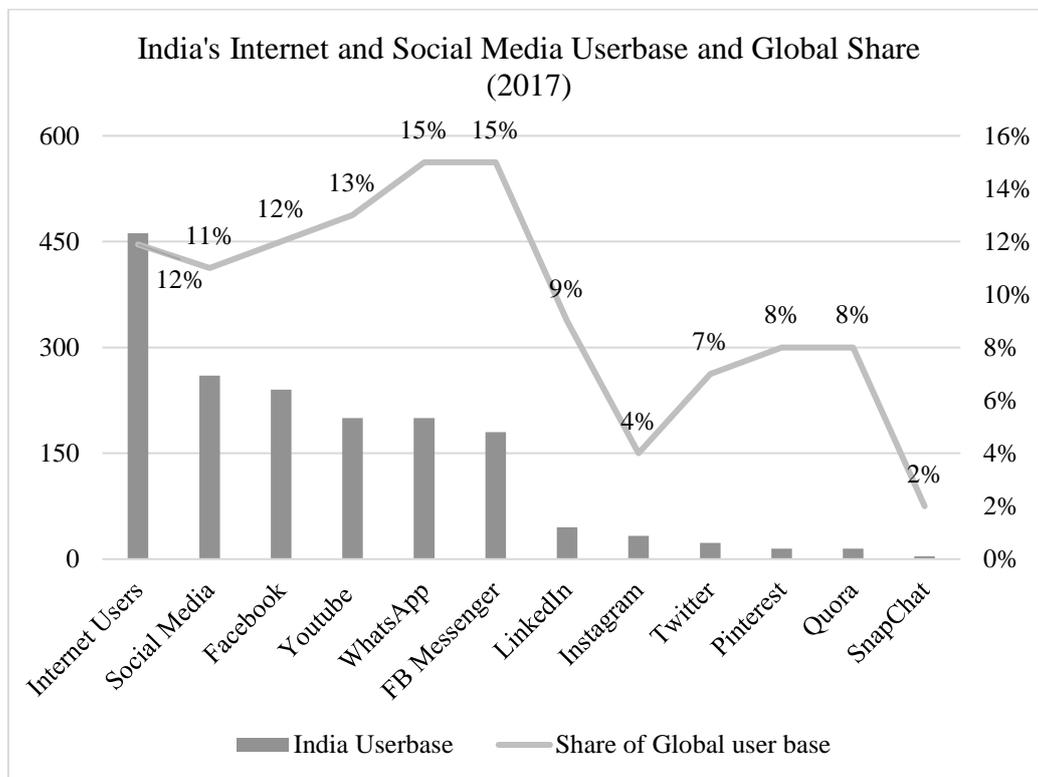


Figure 3: India's Internet and Social Media User base and Share in Global User base (million & percentage points)
(Source: Translatemedia)

¹⁴ <https://www.translatemedia.com/translation-services/social-media/india-social-media/> (Referred on 19th November 2017)

5.5 Is the Western World abandoning the Octogenarian Platform?

A paper published on Recode by (Wagner & Molla, 2018) cited a report by eMarketer that emphasized that Facebook wasn't just losing its users, it was losing it faster than anybody expected. While the fall was earlier predicted to be about 3%, the actual declines ended up at around 10%! Out of various reasons cited, the two critical ones are the older platform losing against the more 'cool' and visual heavy platforms like Instagram and Snapchat because young people aren't ok with sharing their life stories permanently on the internet and also that they complain of their parents and older relatives also being on the platform makes them uncomfortable. eMarketer claimed that Facebook lost about 3 million customers under the age of 25 years in 2017¹⁵. Not only does this decline is big, what is even more worrisome for Facebook is that is its estimated that at least about 2 million users will get out of Facebook this year too, only from the age group below 25 years.

The scenario doesn't seem to be very different for Facebook in Western Europe. A report by (Farey-Jones & Samadi, 2018) suggests, that since the year 2009 Facebook had only reported growth in the social network but at the end of Q2 2018, this streak too broke. Facebook reported a drop in its user base, that too of a whopping 3 million users¹⁶.

6.0 Research Methodology

6.1 Research Objectives

- To study the presence of the sample set on various social media platforms
- To understand the reasons for engagement of the sample with each social media platform
- To find usage behaviour of the sample audience on various social media platforms

6.2 Population and Sampling Technique

The population targeted for this research paper is people in the age group from 20 years to 30 years. Convenience sampling technique was applied for the selection of sample for the primary research. The group selected for the data collection were students from the Rizvi Institute of Management and individuals who fell in the said criteria.

- Sample Size : 117
- Age Group (M / F) : 20 years to 30 years
- Geographic Location : Mumbai
- Occupation : Students, Working professional and Businessmen

¹⁵ <https://www.recode.net/2018/2/12/16998750/facebooks-teen-users-decline-instagram-snap-emarketer>(Referred on 13th September 2018)

¹⁶ <https://www.campaignlive.co.uk/paper/facebook-shares-plunge-amid-first-decline-european-daily-active-users/1488886> (Referred on 13th September 2018)

6.3 Questionnaire

The survey instrument was a questionnaire that was designed to record the response from the target audience. The questionnaire used for the data collection was a set of seven questions on social media penetration and engagement along with a few questions for demographics.

7.0 Findings

7.1 Demographic Profile of the Respondents

As mentioned earlier the respondent set is between 20-30 years of age, male and female with annual income bracketed in three categories.

Gender	< 5 lac pa	5 lac - 10 lac pa	> 10 lac pa	Grand Total
Female	12	10	8	30
Male	52	28	7	87
Grand Total	62	38	15	115

Table 1: Sample Demographic Profile (Source: Primary Research Survey)

Clearly, 87% of all the respondents are from the income group of fewer than 10 lacs per annum. Females make 26% of the group while males make up the rest of 74%.

7.2 Social Media Penetration

Hypothesis Setting:

H₀₁: There is no clear preference between platforms chosen by users (No motivation trigger or reason considered). As per the Chi-square test output (Table 2):

	All	Fo	Fe	Fo-Fe	(Fo-Fe)sq	(Fo-Fe)sq/Fe
Facebook	101	13.45	10	3.4	11.9	1.2
Instagram	97	12.92	10	2.9	8.5	0.9
WhatsApp	111	14.78	10	4.8	22.9	2.3
LinkedIn	78	10.39	10	0.4	0.1	0.0
Pinterest	25	3.329	10	-6.7	44.5	4.5
Quora	29	3.862	10	-6.1	37.7	3.8
Google+	53	7.057	10	-2.9	8.7	0.9
YouTube	92	12.25	10	2.3	5.1	0.5
Twitter	86	11.45	10	1.5	2.1	0.2
Snapchat	79	10.52	10	0.5	0.3	0.0
Total	751				Fcal	14.2
					Ftab (dof=7)	14.1

Table 2: Social Media Platform Adoption (Source: Primary Research Survey)

Note: *Fcal < Ftab (dof 9)

Hence the null hypothesis cannot be rejected. Consequently, we cannot establish a clear preference among the platforms that are chosen by the users. It may be noted, that this is the preference without taking any into consideration any motivation or considering the reasons for which people visit a social media platform.

- WhatsApp is the most adopted social platform by males as well as females. Also, with 95% of overall population using WhatsApp, the platform is almost ubiquitous (For more details, refer Chart 1 in Annexure I)
- After WhatsApp, there is a huge fall in the adoption rate of other social medial platforms by females except for Facebook, where no other platform reaches to even 75% adoption rate. While in case of males there are multiple platforms that fall in the range of 80%-90% adoption
- For males Facebook, Instagram, YouTube and Twitter are other well adopted platforms¹⁷. For females, Facebook is a well adopted platform, while LinkedIn and Instagram are fairly¹⁸ adopted
- Pinterest and Quora are yet to find traction with the Indian audience

7.3 Frequency of Usage of Platforms

Table 8.3 shows and highlights frequency of usage which is highest for the given platform. This can also be called as stickiness as it's essentially shows which platforms have higher traction with the audience. (For more details, refer Chart 2 in Annexure I)

- WhatsApp and Snapchat are viewed and accessed the highest number of times in a day by its users (more than 10 times)
- While 50% users access WhatsApp for more than 10 times a day, 29% of Snapchat users access the app more than 10 times a day
- This is followed by Facebook, Instagram and YouTube which are accessed between 3 to 10 times a day

¹⁷ Adoption Rate equal to or above 80%

¹⁸ Adoption Rate equal to or above 70% but less than 80%

Frequency of using a Social Media platform (Percentage of users checking platform n number of times)										
	Facebook	Google+	Instagram	LinkedIn	Pinterest	Quora	Snapchat	Twitter	WhatsApp	YouTube
Not Everyday	26	57*	12	39*	69*	67*	21	35	1	10
1-2 times a day	23	26	26	0	14	27	26	37**	5	27
3-10 times a day	35****	13	44***	20	14	4	24	27	44	43****
More than 10 times a day	16	4	19	5	2	2	29****	1	50****	20

**** Highest %age of platform users access the platform for more than 10 times a day

*** Highest %age of platform users access the platform between 3-10 times a day

** Highest %age of platform users access the platform between 1-2 times a day

* Highest %age of platform users do not access the platform everyday

Not Everyday	26%	57%	12%	39%	69%	67%	21%	35%	1%	10%
1-2 times a day	23%	26%	26%	0%	14%	27%	26%	37%	5%	27%
3-10 times a day	35%	13%	44%	20%	14%	4%	24%	27%	44%	43%
More than 10 times a day	16%	4%	19%	5%	2%	2%	29%	1%	50%	20%

Table 3: Usage Frequency for various Social Media Platform (Source: Primary Research Survey)

7.4 Motivation to use Social Media Platforms

Social media users have different motivation for being present on various platforms. Each platform means something different to the users and it is critical for the companies to understand what motivates their target audience to be present on social media.

7.4.1 To connect with friends and family

Hypothesis Setting:

H₀₁: There is no clear preference between platforms by the audience when it comes to choose a platform for connecting with friends and family.

As per the Chi-square test output in the table below (Table 4),

To connect with friends and family						
	All	Fo	Fe	Fo-Fe	(Fo-Fe) ²	(Fo-Fe) ² /Fe
WhatsApp	96	35.4	20	15.4	237.9	11.9
Facebook	72	26.6	20	6.6	43.1	2.2
Instagram	42	15.5	20	-4.5	20.3	1.0
Snapchat	33	12.2	20	-7.8	61.2	3.1
Others* ¹⁹	28	10.3	20	-9.7	93.5	4.7
Total	271	100.0		Fcal		22.80
				Ftab (dof=4)		9.488

Table 4: Chi-Square Test for Association output (Source: Calculated on MS Excel based, on Primary Research data)

$$F_{cal} > F_{tab \text{ dof } 4}$$

Hence the null hypothesis stands rejected. There is a clear preference in the choice of platform when it comes to choosing a platform to connect with friends and family.

Inference:

There is a clear preference of WhatsApp over other platforms with 86% of all respondents choosing WhatsApp as the preferable medium for connecting with friends and family. Facebook, Instagram and Snapchat follow WhatsApp in terms of preference, but have a sizable set of respondents who use it for the said purpose.

To connect with friends and family			
	All	Males	Females
Facebook	65%	66%	67%
Instagram	38%	45%	19%
WhatsApp	86%	87%	93%
LinkedIn	5%	4%	11%
Pinterest	1%	1%	0%
Quora	0%	0%	0%
Google+	5%	7%	0%
YouTube	8%	9%	7%
Twitter	5%	6%	4%
Snapchat	30%	33%	22%

Table 5: Preferred Social Media Platform for connecting with friends and family

7.4.2 To know more about their favourite personalities

Hypothesis Setting:

H₀₂: There is no clear preference between platforms by the audience when they want to know more about their favourite personalities

As per Chi-square test output in Table 6,

$$F_{cal} > F_{tab \text{ dof } 5}$$

¹⁹ Social Media platforms which have an occurrence of less than 10% in the overall results have been clubbed together under the "Others" category for the Chi-square test of association.

Hence the null hypothesis stands rejected. There is a clear preference in the choice of platform when it comes to choosing a platform to connect with friends and family.

To know more about your favourite personalities						
	All	Fo	Fe	Fo-Fe	(Fo-Fe) ²	(Fo-Fe) ² /Fe
Facebook	42	22.3	16.6	5.7	33.0	2.0
Instagram	46	24.5	16.6	7.9	61.9	3.7
Others*	25	13.3	16.6	-3.3	10.9	0.7
YouTube	43	22.9	16.6	6.3	39.3	2.4
Twitter	17	9.0	16.6	-7.6	57.1	3.4
Snapchat	15	7.9	16.6	-8.6	74.3	4.5
Total	188	100		Fcal		16.66
				Ftab (dof=5)		11.07

		Not Everyday	1-2 times a day	3-10 times a day	More than 10 times a day	Total
		Facebook	28 26%	24 23%	37 35%	17 16%
Google+	41 57%	19 26%	9 13%	3 4%	72	
Instagram	12 12%	26 26%	44 44%	19 19%	101	
LinkedIn	32 39%	0 0%	17 20%	4 5%	53	
Pinterest	29 69%	6 14%	6 14%	1 2%	42	
Quora	32 67%	13 27%	2 4%	1 2%	48	
Snapchat	18 21%	22 26%	20 24%	24 29%	84	
Twitter	28 35%	30 37%	22 27%	1 1%	81	
WhatsApp	1 1%	6 5%	50 44%	57 50%	114	
YouTube	11 10%	28 27%	45 43%	21 20%	105	

Table 6: Chi-Square Test for Association output (Source: Primary Research data)

Inference:

Instagram has a clear preference with 50% of all respondents saying that they are present on Instagram to know more about their favourite personalities. There is a close fight between YouTube and Facebook for the second spot. (For more details, refer Table 1 in Annexure II)

7.4.3 To share videos and pictures with friends and family

Hypothesis Setting:

H₀₃: There is no clear preference between platforms by the audience for sharing videos and pictures with friends and family

As per Chi-square test output (For more details, refer Annexure III, Table 7),

$$F_{cal} > F_{tab \text{ dof } 5}$$

Hence the null hypothesis stands rejected. There is a clear preference in the choice of platform when it comes to sharing videos and pictures with friends and family.

Inference:

WhatsApp has a clear preference with 65% of all respondents saying that they use WhatsApp for sharing videos and pictures with friends and family. Instagram and Facebook are neck to neck with 50% and 49% respondents using these apps for this purpose. A small set of respondents is also using Snapchat for sharing videos and pictures with friends and family. (For more details, refer Table 2 in Annexure II)

7.4.4 To build professional circle (networking and business opportunities)

Hypothesis Setting:

H₀₄: There is no clear preference between platforms by the audience for building professional circle (networking)

As per Chi-square test output (For more details, refer Annexure III, Table 8),

$$F_{cal} > F_{tab \text{ dof } 5}$$

Hence the null hypothesis stands rejected. There is a clear preference in the choice of platform when it comes to building professional circle (networking).

Inference:

LinkedIn has a clear preference with 60% of all respondents saying that they use the network for professional purposes like sharing profiles to possible recruiters, build professional network, follow companies and other professionals etc. At least 20% respondents also claimed to be using Facebook, WhatsApp and Twitter for professional reasons including building professional networks through these social networks. (For more details, refer Table 3 in Annexure II)

7.4.5 To check news and updates

Hypothesis Setting:

H₀₅: There is no clear preference between platforms by the respondents for staying up to date with what is happening around

As per Chi-square test output (For more details, refer Annexure III, Table 9),

$$F_{cal} > F_{tab, dof 8}$$

Hence the null hypothesis stands rejected. There is a clear preference in the choice of platform when it comes to staying up to date with what is happening around

Inference:

Facebook with 54% of all respondents accepting this platform to stay up to date with what is happening around. Twitter also makes its presence felt with 39% users browsing Twitter for this purpose. LinkedIn too had about a third of respondents using it for checking news and updates while, WhatsApp and Instagram had about a fourth of respondents browsing these apps for this purpose. (For more details, refer Table 4 in Annexure II)

7.4.6 To merely have an online presence

Hypothesis Setting:

H₀₆: There is no clear preference between platforms by the respondents for just maintaining a presence on online platforms

As per Chi-square test output (For more details, refer Annexure III, Table 10),

$$F_{cal} > F_{tab, dof 7}$$

Hence the null hypothesis stands rejected. There is a clear preference in the choice of platform when it comes to simply have an online presence.

Inference:

Having online presence just out of a trend and not for any specific reason has found maximum users on Facebook with 42% of all such respondents. WhatsApp and Instagram are next with a third and a fourth of all such respondents being on these platforms for just an online presence. (For more details, refer Table 5 in Annexure II)

7.4.7 To increase social circle (friends and acquaintances)

Hypothesis Setting:

H₀₇: There is no clear preference between platforms when it comes to increase one’s social network (friends or acquaintances)

As per Chi-square test output (For more details, refer Annexure III, Table 11),

$$F_{cal} > F_{tab, dof 6}$$

Hence the null hypothesis stands rejected. There is a clear preference in the choice of platform when it comes to increase one’s social network (friends or acquaintances)

Inference:

Facebook, with 60% of respondents choosing it as a preferred platform for increasing one’s social network (friends and acquaintances) stands out against other platforms. Instagram with almost half of the respondents choosing it as a preferred platform for increasing one’s social network. (For more details, refer Table 6 in Annexure II)

7.5 Consolidated Summary:

Basis Chi-square Test results it has been established that there is a clear preference between platforms when it comes to users for choosing social media platforms for specific purposes. Below is the consolidate table with various reasons and the choice of platforms in the descending order. Top-5 platforms have been mentioned in the table below (Table 7). Platforms with less than 10% of preference (pref) as cited by all users, have not been considered.

Motivation to use Social Media	Pref 1	Pref 2	Pref 3	Pref 4	Pref 5
To connect with friends and family	WhatsApp*	Facebook**	Instagram	Snapchat	*** ²⁰
To know more about your favourite personalities	Instagram**	YouTube	Facebook	Twitter	Snapchat
To share videos and pictures with friends and family	WhatsApp**	Instagram**	Facebook	Snapchat	YouTube
To build professional circle (networking)	LinkedIn**	Facebook	WhatsApp	Twitter	Instagram
To check news & updates	Facebook**	Twitter	LinkedIn	YouTube	WhatsApp
To merely have an online presence	Facebook	WhatsApp	Instagram	LinkedIn	Google+
To increase social circle (friends and acquaintances)	Facebook**	Instagram**	WhatsApp	Snapchat	LinkedIn

* 75% or more users cited as preferred social media platform

** 50% or more users cited as preferred social media platform

Table 7: Social Media Platform preference for specific motivation (Source: Primary Research data)

²⁰ No other platform had more than 10% users citing it as a preferred social medial platform

8.0 Suggestion and Conclusion

Social Media Marketing has witnessed a rapid growth in the past few years, and is showing no signs of slowing down. Growth in social media and marketing on various social media platforms have created credible opportunities for marketers to use these platforms for marketing by reaching to the right audience at the right time with the right content of the right quality. The challenge however, is to decipher which are the best platforms for the marketers to target.

This paper shed light on three key aspects in terms of user behaviour with various social media platforms. Firstly, we found out that in isolation, there is no clear preference for specific social media platforms that can be established. It means that on the outset it is difficult to understand the difference in the preference for specific social media platforms by the users. Secondly, the consumer research also pointed out towards the stickiness or the number of times a user visits a social media platform in a day. Snapchat and WhatsApp have seen the highest share of their users coming to access them more than 10 times a day. This could be attributed to the interest created by these apps, out of utility or consumer attention, which remains to be further tested. The presence of newer platforms like Snapchat and Instagram on adoption and engagement is a takeaway in the sense that these platforms have made their way on to the top along with the old guards, Facebook and YouTube. Marketers should take this into account while planning their social media marketing strategy. These platforms also by the virtue of smaller but fast growing user base, are more economic and effective in terms of marketing investment.

Lastly, the motivation based adoption of platforms which is the next drilled down step from the generic adoption (which showed no clear preference for the social media platforms by users) suggested, that users do have clear preferences for specific social media platforms when it came to specific motivation for being present on social media. Instagram dislodged older platforms like Facebook and even WhatsApp on celebrity engagement trigger, while finds itself on second preference in other two motivation triggers. Twitter and Snapchat too have been able to seep into imagination of users for various specific reasons like to stay abreast with news and updates, and to increase one's social and professional network. Marketers must take into account these tectonic shifts in the social media platform preferences and engagement while making their social media marketing strategy.

9.0 Future Study

This paper presents three important aspects with respect to the adoption and motivation-wise preferences of various social media platforms of consumers. The study would help marketers to give weightage to each of the social media platform for their relevance based on how and how often are these platforms put to use by the consumers. This can be extended to actually calculate weights of the social media platform for a given product category or target audience demography. This would help marketers to simply key in the total investment into the template with the outcome being actual investment to be made in each or as many social media platforms as one want. The study can also be extended to look at the consumer behavior of the users on these platforms, for example, what kind of brands to people follow on internet and why? Finally, further research can also try to unearth the kind of communication that brands should adopt based on the preference of the audience on social media platforms.

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Annexure I: Social Media Adoption and Stickiness

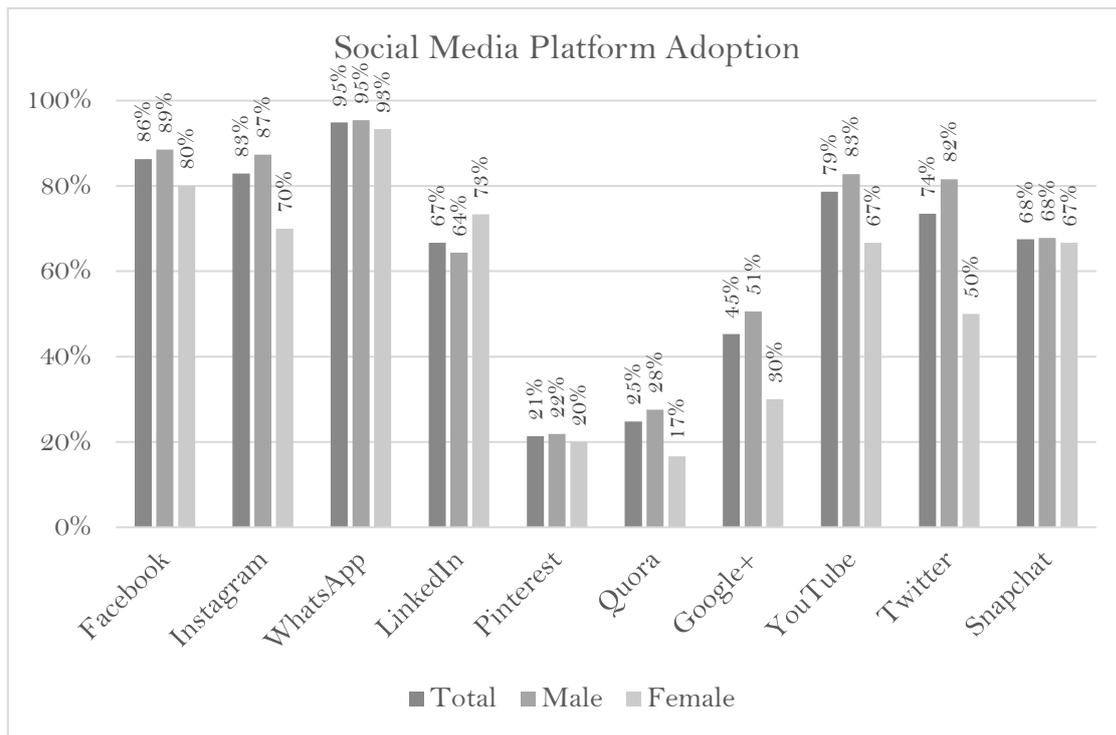


Chart 1: Social Media Platform Adoption (Source: Primary Research Data)

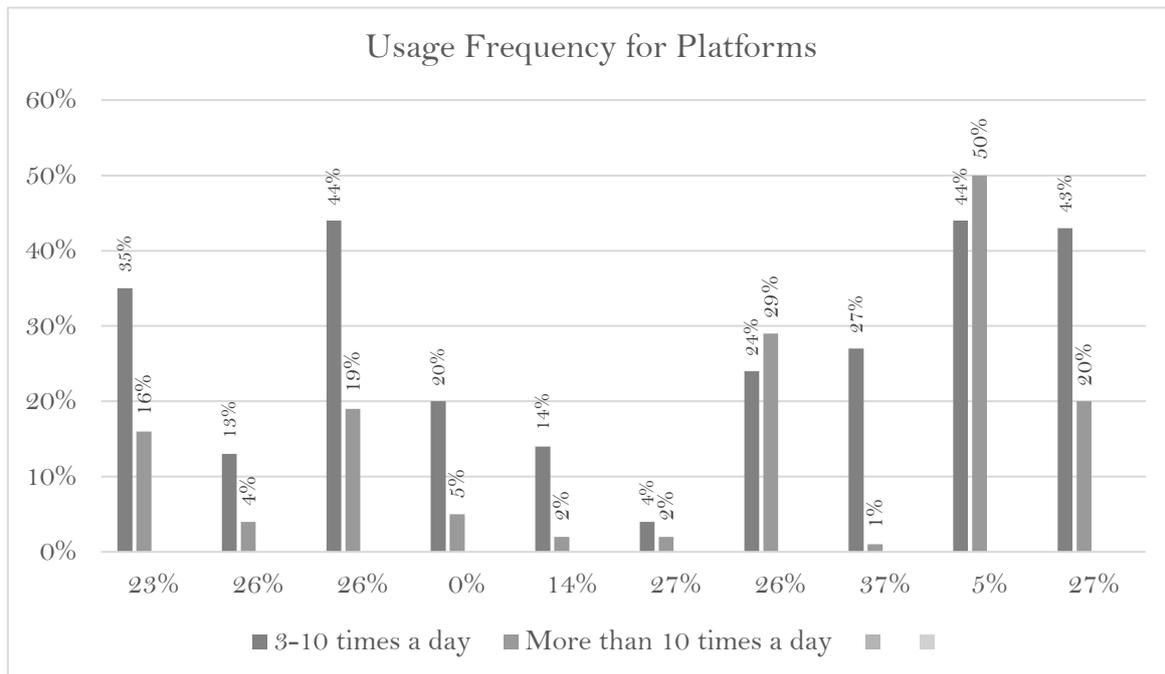


Chart 2: Frequency of usage (Stickiness) (Source: Primary Research Data)

Annexure II: Social Media Platform Usage based on Reasons to use

To know more about your favourite personalities			
	All	Males	Females
Facebook	46%	46%	45%
Instagram	50%	49%	55%
WhatsApp	10%	11%	5%
LinkedIn	8%	8%	5%
Pinterest	2%	1%	5%
Quora	0%	0%	0%
Google+	8%	6%	15%
YouTube	47%	46%	50%
Twitter	18%	21%	10%
Snapchat	16%	17%	15%

Table 1: To know more about your favourite personalities

To check news & updates			
	All	Males	Females
Facebook	54%	53%	59%
Instagram	21%	19%	27%
WhatsApp	24%	26%	18%
LinkedIn	30%	30%	32%
Pinterest	3%	4%	0%
Quora	7%	7%	5%
Google+	16%	17%	14%
YouTube	24%	23%	27%
Twitter	39%	43%	27%
Snapchat	12%	13%	9%

Table 4: To check news & updates

To share videos and pictures with friends and family			
	All	Males	Females
Facebook	49%	51%	42%
Instagram	50%	49%	54%
WhatsApp	65%	61%	79%
LinkedIn	1%	1%	0%
Pinterest	0%	0%	0%
Quora	0%	0%	0%
Google+	3%	3%	4%
YouTube	16%	19%	8%
Twitter	1%	0%	4%
Snapchat	23%	24%	21%

Table 2: To share videos and pictures with friends and family

To merely have an online presence			
	All	Males	Females
Facebook	42%	40%	50%
Instagram	26%	27%	22%
WhatsApp	31%	27%	44%
LinkedIn	18%	22%	6%
Pinterest	8%	7%	11%
Quora	6%	8%	0%
Google+	17%	20%	6%
YouTube	10%	10%	11%
Twitter	14%	15%	11%
Snapchat	13%	12%	17%

Table 5: To merely have an online presence

To build professional circle (networking)			
	All	Males	Females
Facebook	29%	23%	45%
Instagram	17%	15%	23%
WhatsApp	25%	26%	23%
LinkedIn	60%	63%	50%
Pinterest	5%	6%	0%
Quora	6%	6%	5%
Google+	6%	3%	14%
YouTube	8%	9%	5%
Twitter	21%	22%	18%
Snapchat	8%	8%	9%

Table 3: To build professional circle (Business networking)

To increase social circle (friends and acquaintances)			
	All	Males	Females
Facebook	60%	60%	61%
Instagram	48%	49%	44%
WhatsApp	41%	42%	39%
LinkedIn	20%	22%	17%
Pinterest	1%	2%	0%
Quora	2%	2%	6%
Google+	10%	11%	6%
YouTube	11%	11%	11%
Twitter	12%	12%	11%
Snapchat	23%	22%	28%

Table 6: To increase social circle (friends and acquaintances)

Annexure III: Chi-square Tables for Social Media Platform Adoption based on Reasons to use

To share videos and pictures with friends and family						
	All	Fo	Fe	Fo-Fe	(Fo-Fe) ^{sq}	(Fo-Fe) ^{sq} /Fe
WhatsApp	68	31.3	16.6	14.7	217.2	13.1
Instagram	52	24.0	16.6	7.4	54.2	3.3
Facebook	51	23.5	16.6	6.9	47.6	2.9
Snapchat	24	11.1	16.6	-5.5	30.7	1.8
YouTube	17	7.834	16.6	-8.8	76.8	4.6
Others	5	2.3	16.6	-14.3	204.4	12.3
Total	217	100			Fcal	24.93
					Ftab (dof=5)	11.07

Table 7: Chi Square Test Result: To share videos and pictures with friends and family

To build professional circle (networking and business opportunities)						
	All	Fo	Fe	Fo-Fe	(Fo-Fe) ^{sq}	(Fo-Fe) ^{sq} /Fe
Facebook	25	15.6	16.6	-1.0	1.0	0.06
Instagram	15	9.4	16.6	-7.2	52.2	3.14
WhatsApp	22	13.8	16.6	-2.9	8.1	0.49
LinkedIn	52	32.5	16.6	15.9	252.8	15.23
Others	28	17.5	16.6	0.9	0.8	0.05
Twitter	18	11.3	16.6	-5.4	28.6	1.72
Total	160	100.0			Fcal	20.69
					Ftab (dof=5)	11.07

Table 8: Chi Square Test Result: To build professional circle (networking and business opportunities)

To check news & updates						
	All	Fo	Fe	Fo-Fe	(Fo-Fe) ^{sq}	(Fo-Fe) ^{sq} /Fe
Facebook	50	23.6	11.1	12.5	155.6	14.00
Instagram	19	9.0	11.1	-2.1	4.6	0.42
WhatsApp	22	10.4	11.1	-0.7	0.5	0.05
LinkedIn	28	13.2	11.1	2.1	4.4	0.40
Others	9	4.2	11.1	-6.9	47.1	4.24
Google+	15	7.1	11.1	-4.0	16.3	1.47
YouTube	22	10.4	11.1	-0.7	0.5	0.05
Twitter	36	17.0	11.1	5.9	34.5	3.10
Snapchat	11	5.2	11.1	-5.9	35.1	3.16
Total	212	100.0			Fcal	26.88
					Ftab (dof=8)	15.5

Table 9: Chi Square Test Result: To check news & updates

To merely have an online presence						
	All	Fo	Fe	Fo-Fe	(Fo-Fe) ^{sq}	(Fo-Fe) ^{sq} /Fe
Facebook	33	22.917	12.5	10.4	108.5	8.7
Instagram	20	13.889	12.5	1.4	1.9	0.2
WhatsApp	24	16.667	12.5	4.2	17.4	1.4
LinkedIn	14	9.7222	12.5	-2.8	7.7	0.6
Others	19	13.194	12.5	0.7	0.5	0.0
Google+	13	9.0278	12.5	-3.5	12.1	1.0
Twitter	11	7.6389	12.5	-4.9	23.6	1.9
Snapchat	10	6.9444	12.5	-5.6	30.9	2.5
Total	144	100			Fcal	16.20
					Ftab (dof=7)	14.06

Table 10: Chi Square Test Result: To merely have an online presence

To increase social circle (friends and acquaintances)						
	All	Fo	Fe	Fo-Fe	(Fo-Fe) ^{sq}	(Fo-Fe) ^{sq} /Fe
Facebook	50	26.3	14.3	12.0	144.7	10.1
Instagram	40	21.1	14.3	6.8	45.8	3.2
WhatsApp	34	17.9	14.3	3.6	13.0	0.9
LinkedIn	17	8.9	14.3	-5.3	28.5	2.0
Others	20	10.5	14.3	-3.8	14.1	1.0
Twitter	10	5.3	14.3	-9.0	81.4	5.7
Snapchat	19	10.0	14.3	-4.3	18.4	1.3
Total	190	100.0			Fcal	24.22
					Ftab (dof=6)	12.59

Table 11: Chi Square Test Result: To increase social circle (friends and acquaintances)

Volatility Modelling of the Indian Stock Market

Mr. Jamil Saudagar¹

Abstract

This paper attempts to study and model volatility of stocks / indices of the Indian Stock Market. The time period of the study is 19 years of daily closing value of the NSE500 index. There are 4813 observations in the study period. The study has been carried out at an aggregate level using the GARCH model. 1 to 3 period lags have been used in the study. The GARCH volatility modelling has been done using three distributions (Gaussian, t and Generalised Error Distribution). The GARCH (1,2) has been selected as the most appropriate model to apply to Indian Stock Markets across the three distributions based on the minimum AIC / BIC value criterion..

Key Words: *Volatility Modelling, Indian Stock Markets, GARCH, volatility clustering, heteroscedasticity AIC, BIC*

1.0 Introduction

Stock Market returns are uncertain in nature and are evolving due to the fact that it is continuously responding to and adjusting to the constant stream of material bits of information. Every bit of news is processed by traders and investors, and is reflected in the trades they execute. At an aggregate level, this shapes up the movement of the stock market. This constant adjustment of stock prices, in an attempt to discover the “fair” price leads to their up / down movement. This up / down movement is nothing but the volatility in the stock (asset) price.

Volatility, therefore refers to the degree of oscillation of the asset price series over a period of time. Though market behaviour is generally unpredictable, volatility, in itself has certain properties which makes it conducive to statistical analysis (Baillie & Bollerslev, 1990). Historically, studies have demonstrated that asset returns exhibit clustering i.e. large (small) changes are followed by large (small) changes. This property makes it easier to forecast volatility.

“The starting point for every financial model is the uncertainty facing investors, and the substance of every financial model involves the impact of uncertainty on the behavior of investors and, ultimately, on market prices.” (Campbell, Lo, & Mackinlay, 1997)

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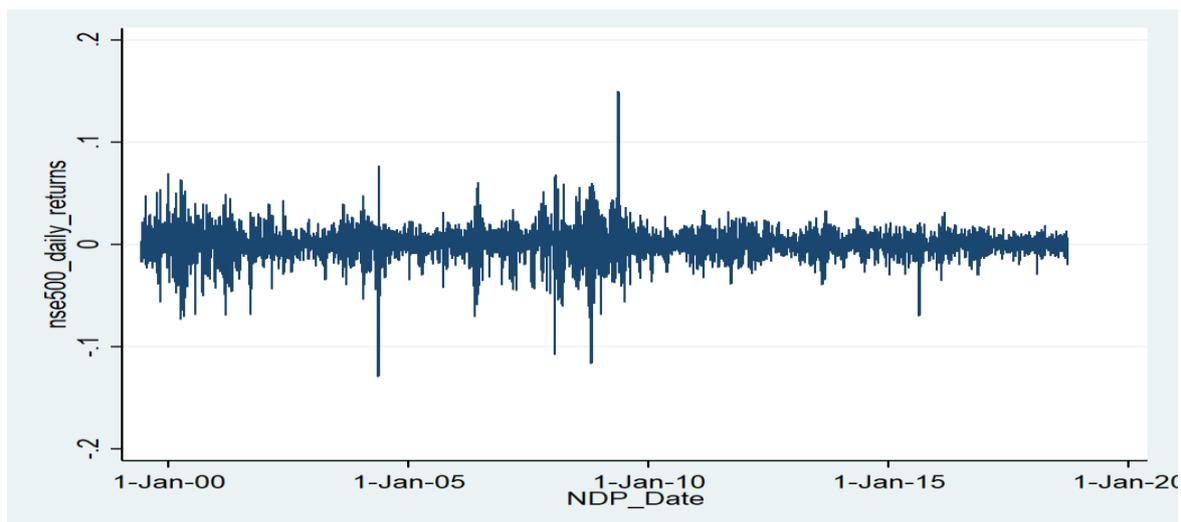


Figure 1: Daily Returns of NSE NIFTY 500 for the period 08-Jun-1999 to 28-Sep-2018

It has also been observed and validated that over a period of time, volatility reverts to its mean (i.e. mean reversion). Also, empirical evidence seems to suggest that volatility is correlated across asset classes. Leverage Effect (i.e. asymmetric response to positive and negative news) has also been evidenced in studies on volatility. Thus, the ability to model volatility adds some amount of stability to investment decisions when viewed through a risk-return prism.

India with its huge market, stable governance and enormous potential amongst its peers is an important investment destination for major economies of the world. Foreign Institutional Investors (F.I.I.'s) have invested about USD 171 billion in Indian Markets since FY02 (IBEF, 2018). While a lot of research has been carried out in developed economies, an emerging market like India, offers scope for research on modelling volatility. This paper therefore attempts to model volatility with respect to the Indian Stock Market.

The next section defines the objective which shall be covered in this paper followed by a review of related Literature which encompasses international and India-specific research. Section Four outlines the data selection methodology, data frequency, data source along with the period of study. This is followed by a description of the adopted Research Methodology. Section Six analyses and interprets the data. The next section highlights the limitations and scope for further research. Section Eight concludes the paper.

2.0 Objectives

- To model volatility of the Indian Stock Markets.

With this in mind the relevant literature is studied in the following section.

3.0 Literature Review

“The great workhorse of applied econometrics is the least squares model. This is a natural choice, because applied econometricians are typically called upon to determine how much one variable will change in response to a change in another variable. Increasingly, however, econometricians are being asked to forecast and analyze the size of the errors of the model. In this case, the questions are about volatility and the standard tools have become the ARCH / GARCH models” (Engle, 2001). One key assumption of the least squares model is that the squared value of the error terms remains constant over a period of time (i.e. homoscedasticity). However, studies have amply demonstrated that the error terms of the asset returns series do not exhibit homoscedastic behaviour. Therefore, to study and model volatility ARCH / GARCH becomes the most appropriate model. The ARCH (Autoregressive Conditional Heteroscedasticity) model was developed by (Engle R. F., 1982) to measure the dynamics of U.K’s inflation data. While the ARCH model allowed for the conditional variance to change over time, it assumed time itself to be constant i.e. it could accommodate varying degrees of volatility but assumed the volatility occurrence at specific times. An extension to the ARCH model was developed by (Bollerslev, 1986) which addressed this specific limitation by allowing for time to be modelled as a stochastic variable. While these two frameworks have been the bulwark for most of the empirical studies on asset volatility, over time, modifications to the GARCH model have been developed, most notably, the E-GARCH (Nelson, 1991), the GJR GARCH (Glosten, Jagannathan, & Runkle, 1993) and the T-GARCH (Zakoian, 1994) models.

Initial studies on the statistical properties of stock returns were conducted by (Mandelbrot, 1963) and (Fama, 1965) where they found that asset returns exhibit autocorrelation for short lags as opposed to the theory of random walks which postulates that successive price changes are independent (i.e. has no memory) and are identically distributed random variables. (Akgiray, 1989) considered the daily series of indices for the period Jan 1963 to Dec 1986 and compared four different models (historical estimate, EWMA Forecast, ARCH Forecast and GARCH Forecast) using four measures (mean error, root mean square error, mean absolute error, mean absolute percent error) to conclude the best fitting model. He concluded that daily return series exhibit significant levels of second order dependence and GARCH (1,1) was the best fitting model. (Baillie & Bollerslev, 1990) applied the GARCH model to study four foreign exchange spot rate series recorded on an hourly basis for a six monthly period. They concluded that the volatility in the hourly data across observed currencies was the same and it appeared to be related to the opening and closing of world’s major markets. (Bollerslev, Chou, & Kroner, ARCH modeling in finance, 1992) .

(Murinde & Poshakwale, 2001) have used the daily return of prominent indices from six European countries for different periods and have applied the ARIMA, BDSL and symmetric and asymmetric GARCH models to test for daily return volatility. They observed that in all the six markets volatility was persistent, volatility exhibited significant conditional heteroscedasticity and non-linearity. Their findings suggest that though GARCH is the most appropriate model, the symmetric / asymmetric GARCH models were not best suited to predict future volatility. (Pagan & Schwert, 1990) used U.S. monthly stock returns data for the period 1834 – 1925 and compared several statistical models and concluded that the GARCH was the best suited to model volatility. Similarly, (Andersen & Bollerslev, 1998) in their studies of daily spot exchange rates of DM-USD and Yen-USD found that GARCH was a good model to forecast volatility. However, (Tse, 1991) found that the EWMA models were more accurate in predicting the Japanese Stock Markets.

(Karmakar, 2005) used returns of the CNX Nifty and SENSEX, besides the returns of 50 stocks listed in the CNX Nifty index. The return series was for the period Jan 1991 to June 2003. He found that the GARCH (1,1) was the best fit to model volatility for all the fifty stocks barring four. Eight out of the fifty stocks showed significant signs of a leverage effect and an asymmetric model like the E-GARCH model would be a more suitable model to apply. (Pandey, 2005) used high frequency data for the period Jan 1999 to Dec 2001. The data comprised of stocks of the top 50 large cap companies. Also, low frequency data (daily closing price) from 1st Jan 1996 to 31st Dec 1998 was used for forecasting conditional volatility. In his study he used different models and concluded that for estimating short term volatility (i.e. a week or a month) the extreme volatility models were more accurate as compared to the conditional volatility models. Conditional volatility models were better at “estimating volatility for the past in terms of bias, extreme value estimators based on observed trading range perform well on efficiency criteria”. (Kumar, 2006) analyses the ability of various volatility forecasting models on stock and forex markets. He concludes that EWMA is a better model for forecasting volatility in stock markets and GARCH (5,1) is a better fit for forex markets. (Bordoloi & Shankar, 2008) used data from the NSE and BSE indices covering a period from Jan 2000 to Oct 2007. They found that variances of the stock returns are asymmetrical. The T-GARCH was better at explaining the BSE indices and S & P CNX 500 while E-GARCH was better at explaining the S&P CNX Nifty.

(Srinivasan & Ibrahim, 2010) used SENSEX daily returns from the period 1st Jan 1996 to 29th Jan 2010. The models used were GARCH (1,1); E-GARCH (1,1) and T-GARCH (1,1). Results indicate that despite the presence of leverage effect, symmetric GARCH models perform better in forecasting conditional variance.

4.0 Data Sources

The study has been carried out over a 19 year period from 08-Jun-1999 to 28-Sep-2018 using the NSE NIFTY 500 index as a proxy to represent the market. The study has been carried out at an aggregate level.

The NSE NIFTY 500 index has been selected after careful consideration mainly because of the following reasons :-

- NSE NIFTY 500 is broad-based indices and capture more than 90% of the market capitalization of all listed companies in the exchange. These indices are made up of stocks selected from across sectors (~ more than 20). Therefore, they serve as a good representation of the market.
- These indices serve as an important benchmark to measure portfolio performance in the investment community and by professional fund managers.

Daily returns have been used and the adjusted closing values have been considered while calculating daily returns. There are 4813 observations for the index.

The data has been sourced from the database of Accord Fintech. Stata 13 has been used as a software tool to carry out statistical analysis.

5.0 Research Methodology

5.1 Returns Calculation

The returns have been calculated as the natural logarithmic difference between two consecutive index values. Therefore, the returns for period 't' is calculated as :

$$R_t = \ln(P_t/P_{t-1}) \dots\dots\dots (1)$$

where P_t is the index value at period t & P_{t-1} is the index value at period t – 1

5.2 Diagnostic Tests

The following tests have been conducted to determine if the univariate time series of index returns is an appropriate fit for modelling volatility. The tests that have been conducted cover various facets of this time series data.

We begin by testing the series for volatility clustering. Apart from visually examining the series, we also execute the Breusch-Godfrey LM test to check for serial dependence. Serial dependence in the series is indicative of volatility clustering.

H_0 : There is no serial correlation.

Next, the series is tested for the ARCH effect (autocorrelation in the squared error terms).

H_0 : No ARCH effect

Finally, the series is checked for evidence of heteroscedasticity in the residuals using the Breusch-Pagan/Cook-Weisberg test.

H_0 : Constant variance

All the tests have been executed with a 95% confidence level.

5.3 The GARCH Model

GARCH is an approach to model the variance of an asset / index as a function of its past values.

The GARCH (p,q) process is defined as :

$$\sigma_t^2 = \omega + \sum_{i=1}^q (\alpha_i \varepsilon_{t-1}^2) + \sum_{j=1}^p (\beta_j \sigma_{t-j}^2) \dots\dots\dots (2)$$

σ_t^2 is the variance of the asset being modelled, α_i is the constant term of the asset, ε_{t-1}^2 is the squared error term of the previous period, while σ_{t-j}^2 is the volatility in the previous period. The coefficients in the equation should be non-zero. The size of the α and β parameters are indicative of the intensity and duration of the asset's volatility (to a given shock) . A high value for β means that shocks / surprises in the series are persistent in nature and decay slowly while a high α value means that the intensity of the shock is higher (makes the market more volatile).

5.4 Model Selection

The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) have been used as estimators to select the appropriate GARCH model. The lower the value, the better the model is.

6.0 Data Analysis and Interpretation

This section studies the results of the various tests performed on the daily returns series of the NSE 500 index. The section begins by studying and interpreting the summary statistics of the index, followed by appropriate diagnostic tests. Once all the diagnostic tests are run, an appropriate GARCH model will be selected and applied to the time series.

6.1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Returns	4813	.0005055	.0147238	-.1288472	.1503	-.5266039	10.88527

Figure 2: Descriptive Statistics for NSE 500 index returns (Period : 09th June 1999 – 28th Sep 2018)

The daily mean is about 0.05 % (close to zero) with a high standard deviation of 1.47%. The lower band is – 12.89 % while the upper band is 15.03 %, therefore the daily fluctuations could range ~ 13 % on either side.

The series exhibits a negative skewness and an excess kurtosis of 7.88 (leptokurtic). Most financial time series data exhibit this behavior. High kurtosis means that the returns series clusters around the mean having fatter tails, indicating a possibility of extreme outcomes.

6.2 Results of Diagnostic Tests

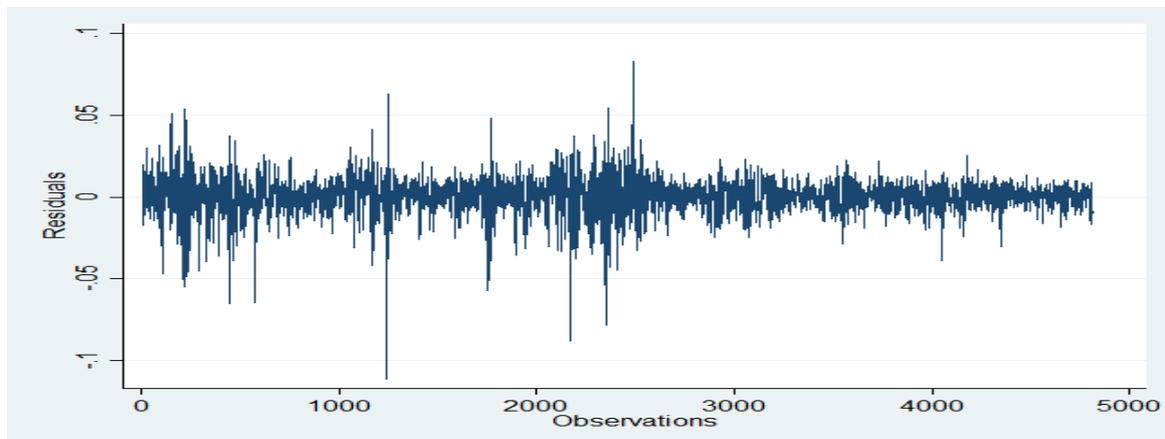


Figure 3: Evidence of Volatility Clustering in the Residuals (Period : 08th June 1999 – 28th Sep 2018)

From the figure above (Figure 2), we can observe volatility clustering (i.e. small changes being followed by small) of the residual terms. This is indicative of serial dependence in the time series data. The observation can be further corroborated by using the Breusch-Godfrey LM test (see Figure 3) for the presence of serial dependence. The p-value obtained is less than 0.05 and so we can reject the null hypothesis of the series having no serial correlation.

Breusch-Godfrey LM test for autocorrelation

lags (p)	chi2	df	Prob > chi2
1	1956.194	1	0.0000

H0: no serial correlation

Figure 4: Result of the Breusch - Godfrey LM Test

Next, we test the series for the ARCH effect using the ARCH-LM test (see Figure 4). The obtained p-value is less than 0.05 and thus we can conclusively confirm the presence of ARCH effect.

LM test for autoregressive conditional heteroskedasticity (ARCH)

lags (p)	chi2	df	Prob > chi2
1	814.611	1	0.0000

H0: no ARCH effects vs. H1: ARCH(p) disturbance

Figure 5: Results of the ARCH-LM Test

Next, we test the series for heteroscedasticity in the residuals using the Breusch-Pagan / Cook-Weisberg test for heteroscedasticity.

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Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Returns

chi2(1)      =    68.83
Prob > chi2  =    0.0000

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Figure 6: Results for Heteroskedasticity test in the residual term

The p-value is less than 0.05 and therefore we can reject the null hypothesis and conclude that the residuals exhibit heteroscedasticity.

6.3 Modelling Volatility using the GARCH Model

Since, the diagnostic tests have been run and important pre-conditions to apply the GARCH model have been met, we can now apply the aforesaid model and select the most appropriate from amongst the models based upon the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC).

The table below is a list of various models and their AIC / BIC values. The model with the least AIC / BIC value is the most appropriate and parsimonious model.

Model	Gaussian		t - Distribution		General Error Dist.	
	AIC	BIC	AIC	BIC	AIC	BIC
GARCH (1,1)	-31903.54	-31871.15	-31960.39	-31921.52	-31931.70	-31892.83
* GARCH (1,2)	-32003.68	-31971.29	-32054.85	-32015.97	-32026.31	-31987.44
GARCH (1,3)	-31948.09	-31915.69	-32007.36	-31968.49	-31979.16	-31940.29
GARCH (2,1)	-31363.40	-31331.01	-31609.04	-31570.16	-31538.58	-31499.71
GARCH (2,2)	-31336.89	-31304.50	-31581.00	-31542.13	-31514.87	-31476.00
GARCH (2,3)	-31127.27	-31094.88	-31471.93	-31433.05	-31391.74	-31352.86
GARCH (3,1)	-31304.87	-31272.47	-31589.63	-31550.76	-31509.47	-31470.59
GARCH (3,2)	-31259.22	-31226.82	-31567.30	-31528.43	-31482.77	-31443.89
GARCH (3,3)	-31112.50	-31080.10	-31493.75	-31454.88	-31398.73	-31359.86

Table 1: AIC / BIC values for GARCH Model selection

Thus from the above table we can see that GARCH (1,2) has the lowest AIC / BIC values across the three distributions and so we can conclude that GARCH (1,2) is the most appropriate to model volatility of Indian Stock Markets.

7.0 Scope and Limitations of the Study

The NSE500 index has been used as a proxy to represent the Indian Stock Market. The study has been carried out at an aggregate level using daily returns. The volatility study has been carried out using only the GARCH model using a lag period of 1 to 3 days. The study is for a period of 19 years from 08th June 1999 – 28th Sep 2018 (4813 days).

8.0 Conclusion

The objective of the paper was to select an appropriate model to model volatility of the Indian Stock Markets. To begin with the series was examined to ascertain if it met the GARCH requirements. After confirmation the GARCH model was applied under three distributions and for lags between one and three.

As per the results, for all the three distributions, the GARCH (1,2) model was the most appropriate model for the period of the study and can be used to forecast volatility of the Indian Stock Markets.

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Determinants of Debt Coverage for Government-backed Firms in India

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Abstract

This study seeks to identify the capital structure determinants of central Government backed firms. This is important since one does not come across many studies related to the Government-backed enterprises. Moreover, in the last disinvestment phase, the Government-backed enterprises in India have become more market oriented in terms of raising funds. The Government-backed enterprises have got to depend more on extra-budgetary resources (EBRs) for their needs. Government-backed enterprises are also different in several ways than their counterparts in the private sector. For this study a sample of forty-one profit making manufacturing Government-backed enterprises is considered for the time period March, 1990 to March, 2003. Multiple regressions have been used to find out the factors affecting capital structure. The independent variables have been considered keeping in view Agency Theory, Pecking Order Hypothesis and other established capital structure models. The results suggest that the capital structure (Total Borrowing to Total Assets) of the profit making Government-backed enterprises is affected by Asset Structure (Net Fixed Assets to Total Assets, NFATA), profitability (Return on Assets, ROA) and Tax. Findings were contradiction to that of pecking order hypothesis, growth (defined as growth in sales) is positively related to leverage. As predicted by theory NFATA and ROA are respectively positively and negatively related to leverage. In contradiction to theory tax and leverage are negatively related. Firms with less effective Tax Rate have gone for more debt. None of the other variables like non-debt tax shield (NDTS), Volatility, Size were found to be significant.

Keywords: *Financing; Capital Structure; Government-backed enterprises; Pecking Order Theory,*

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1.0 Introduction

The capital structure pattern is of vital importance for the financial well-being of companies. The corporate finance decisions in Public Sector Undertakings affects not only the financial soundness of the concerned Private Equity holders, but also the financial health of the nation as a whole, since these are essentially public investment decisions of the government and a number of agencies of the Government are involved in this process. In India, the government set-up Government-backed enterprises as an instrument to remove regional disparities, eradicate unemployment problems, upliftment of backward areas, and backward classes. Moreover, in the years following independence, the private sector industrialists were not forthcoming to establish industries involving huge investments. As a result, government had to step in. Since the dawn of independence on August 15th, 1947, Government-backed enterprises have acted as a major policy instrument in the transition of the country from a planned economy to a market economy. The various industrial and economic policies of the government have highlighted the role of public sector in the economic development and it was clear from pre 1991 policies that had a pro public sector approach all these days.

In the changed circumstances, the Government-backed enterprises, although appreciated for their contribution in providing large-scale employment, and industrial development, are also criticized for their financial performance in terms of return earned on the public money invested therein. Due to other compelling reasons then and dismal performance of Government-backed enterprises in some of the area; the government had to rethink and formulate a new vibrant economic policy in 1991, which marked the beginning of liberalization process in India. Post 1991, the financing environment of Government-backed enterprises has experienced a lot of change. Government-backed enterprises have been required to access the market for further financing. Instead of extending budgetary support to the Government-backed enterprises, the government has used the disinvestment route to augment its own resources. Successive government irrespective of the party ideology of the ruling party or combination could not stop the disinvestment process. The disinvestment, though has not resulted in large-scale privatization, has made the Government-backed enterprises more market savvy. It has opened the route for them to go for IPOs etc.

1.1 Capital Structure: Meaning and Importance

Broadly, three kinds of policies come under purview of financial strategy. They are capital structure policy, dividend policy and capital budgeting policy. All three policies are important in their own way and are interlinked. This paper concentrates on the capital structure puzzle applied towards the Government firms.

The capital structure of financing pattern decision is a significant managerial decision. It influences shareholders' wealth. As a result, the market value of the share may be affected by the capital structure decision. The capital structure decision is a continuous process. The shape of the same changes from what it was at the inception to what it is at the time of expanding the business. Any change in the capital structure pattern affects the debt-equity mix, which in turn influences the cost of capital. Consequently, this affects the value of the firm. Similarly, capital structure policy and dividend policy are interrelated. Dividend policy affects the profits available for reinvestment. Retention of profits for reinvestment strengthens the shareholders' equity position. In a nutshell, we can say that capital structure has a bearing on the cost of capital, net profit, earnings per share, dividend payout ratio and liquidity position of the firm. These variables, coupled with others, determine the value of a firm.

The choice of a firm's capital structure is a management problem. It is essentially concerned with how the firm decides to divide its cash flows into two broad components, a mixed component that is earmarked to meet the obligations towards debt (principal component) and a residual component that belongs to equity shareholders.

1.2 Determinants of Capital Structure: Theoretical Aspects

Corporate finance literature has focused on two broad categories of explanation for capital structure viz., 1) agency theoretic explanations that stress conflict of interest between stakeholders in the firms; and 2) explanations that stress tax consequences of capital structure choices.

1.2.1 Agency Cost Theory: Explanations of Capital Structure:

An insight into the literature on capital structure shows several distinct conflicts between the investors holding different classes of securities. These conflicts occur because holders on one class of investors (typically equity holders) act as agents for other investors and take decision that affect the value of the firm as a whole. As a result, these investors have an incentive to engage in opportunistic behavior that increases their payoffs at the expense of other classes of investors and the firm as a whole.

The reduction in the firm's value that results from opportunistic behaviour by those in control of a corporation is termed the agency cost of financing. If they are rational, the holders of securities whose value is reduced by opportunist behaviour, factor their expected losses into the price that they are willing to pay for their securities. Hence it is in the firm's residual owners' interest to choose capital structures that minimize agency costs, thereby maximizing the price at which each firm's securities can be sold. As a result of these choices, if agency theoretic explanations are valid, the observed capital structure of each firm should depend on the potential for opportunistic behavior in that firm.

The potential for opportunistic behavior in the firm depends on the extent to which the agent's options affect value, and the extent to which contracts that regulate actions can be written and enforced on the firm. Thus, agency costs will depend upon the firm's technology, development of financial institutions and markets, the investors' incentives to monitor, and the legal system in each country, among other factors.

The literatures on corporate finance have identified several conflicts of interest that arise in different situations and analyze financial structures that minimize them. The two most important are as below:

(i) Conflict between firm's inside and outside investors

The firm's insiders frequently have opportunities to consume perquisites in ways that cannot be monitored by outside investors. This creates a conflict between the inside and outside investors. This conflict can be mitigated in the following ways:

- By issuing debt securities instead of equity shares, the insiders can commit themselves to a pre-specified level of payment to outside investors, thus reducing chances for opportunistic behavior.
- By issuing debt securities with shorter maturity, the insiders commit themselves to renegotiating the firm's financing at short intervals. This reduces the investors' opportunity to exploit the creditors.

(ii) Conflict between equity holders and debt holders

A second important conflict of interest is between the firm's equity holders and its debt holders. As leverage increases, the equity holders have an incentive to siphon funds out of the firm through dividends and stock repurchases. This is because all the siphoned funds go to the equity holders, whereas the consequent reduction in firm value is shared with debt holders. In addition, because the value of equity is a convex function of the value of the firm, as leverage increases equity holders have an incentive to select risky policies even if they lead to decrease in firm value. The conflict between equity holders and debt holders can be reduced by:

- Lowering debt levels in industries where the potential for opportunistic behaviour is high.
- Securing long-term investments with specific capital assets
- Shortening the maturity of debt

From the above discussion it may be concluded that maturity of debt is a critical variable agency models. Hence, finance theorists while discussing capital structure models analyze the firm's choice of long-term and short-term debt levels. The measure of long-term indebtedness is represented by the ratio of book values of long-term debt to total equity (LTDTE) and that of short-term indebtedness is the ratio of the book values of short-term debt to book value of equity. Some authors have used long-term debt to total assets (LTDTA) and short-term debt to total assets (STDTA).

The debatable point in the present context is whether such classification of debt on the basis of maturity period matches in the case of public enterprises' capital structure choice? In the case of sample Non-government shareholders under study, the conflict between insiders and outsiders (both equity holders) is limited since the Government is the majority owner with very less retail investors. The second important area of conflict between the firm's equity holders and the debt holders can be said to hold good only in case of Non-government shareholders. Here, although the Government provided loans earlier, the investing public through public sector bonds and fixed deposits also supplement such debts. The financial institutions and commercial banks too provide for the same. One may argue that such conflict of interest may be minimal since the Government owns the majority of these institutional fund suppliers, but such an argument can be countered by the fact that these institutions are supposed to act and perform well without bias and often do so.

In the changed economic scenario, FIs and banks have a new mandate to compete and perform better on the prospect of being eliminated. Furthermore, in a good number of Non-government shareholders, foreign agencies have invested as debt holders only. As a result, the conflict of interest as described in agency theory will also apply in the case of Non-government shareholders. The source base for debt and equity financing of Non-government shareholders is also expanding due to reduction in budgetary support to Non-government shareholders.

1.2.2 Determinants of Capital Structure under Agency Theory:

Asset Structure:

The composition of the firm's assets affects its ability to commit not to engage in opportunistic behaviour. Fixed assets usually have collateral value. A firm with fixed assets can issue secured debt, thereby limiting its ability to expropriate the debt-holders. Thus firms with greater amount of fixed assets are expected to issue more long-term debt than firms with fewer fixed assets. Net fixed assets to total assets (NFATA) is used as measure of the firm's fixed assets structure. Usually it is expected that this ratio is positively related to LTDTE or LTDTA and negatively related to STDTE or STDTA.

In the absence of collateral, a greater degree of monitoring by creditors may be optimal. Issuing debt with shorter maturity facilitates monitoring by creditors. Thus, it is expected that firms which do not borrow to finance fixed assets have more short term debt. A measure of the firm's financing needs, other than the need to finance fixed assets, is the Ratio of Net Sales to Net Fixed Assets (NSNFA). Firms with a high NSNFA ratio have cost structures requiring more monitoring and are, therefore, expected to have more short term than long-term debt.

Leverage and Liquidity Constraints:

Literature suggests that internally generated capital is cheaper than external financing. This implies that the firms would finance internally first, and issue debt only when such low cost structures of financing have been exhausted. The firm's initial excess funds are measured by DIVCSH, the ratio of dividends paid out to shareholders to its cash flow available for investment: profit after tax plus depreciation. The higher this variable, the less each constrained the firm is. Thus, it is expected that both LTDTE and STDTE would be negatively related to DIVCSH.

An alternative variable that has been used to measure the firm's ability to generate capital internally by Titman and Wessels (1988), among others is profit before interest and taxes over total assets (PROFIT). In studies of the U.S. economy and that of Demirgüç-Kunt and Maksimovic (D&M), this variable has repeatedly been found to be negatively related to average.

As suggested by Myers (1977), equity holders in highly leveraged firms with significant growth opportunities have incentives to adopt sub-optimal investment policies. If this agency cost is significant, it is expected that fast-growing firms will be financed with equity or short-term debt. Here, we consider CAGR of Sales in the period under study as growth. Capital expenditure over total assets and the growth of total assets measured by the percentage change in total assets can also be taken as indicators of growth (Titman and Wessels, 1988).

Firm Size:

Studies by Barclay and Smith (1993) and Baias and Hillion (1991) have come out with evidence that financing patterns in developed countries differ according to the size of the firm. This could be because access to financial markets may be a function of the firm size. Additionally, the amount of monitoring by investors may depend on the liquidity of the market for the firm's equity, which in turn is related to firm size. The D&M study allows for these effects by segmenting the sample into four quartiles by size of total assets and including dummy in the equations. They conclude that the larger firms find it easier to obtain long-term financing compared to the smaller ones. In the present study, the log of total assets has been taken as the proxy for size.

Firm Age:

There are arguments supporting the prediction that younger firms will be less indebted (Titman and Wessels, 1988). Younger firms have shorter credit histories, which makes it difficult to judge their quality. Younger firms also tend to be riskier since they exit more frequently. However, the D&M study found no significance for the age variables included as dummy. In this study this variable has not been considered.

Industry Classification:

Studies by Maksimovic (1988), Maksimovic and Titman (1990) include industry dummies to capture differences in asset structure across industries that are not captured by NFATA and NSNFA. They argue that the product market structure and type of competitive interaction across firms differs from industry to industry. To the extent that capital structure affects the incentives of firms to enter into implicit contracts with rivals or to maintain reputations, capital expenditures will differ systematically across industries. We have not considered any proxy for the type of industry since the sample size is small.

Market Valuation of Equity:

The measures of the firm's capital structure, the ratios of the book values of long-term and short-term debt to total equity, implicitly assume that book values adequately measure the economic values used in determining the firm's capital structure. However, book values do not directly measure the market's valuation of the firm's growth opportunities. If the firm borrow against the value of growth opportunities, those with higher market valuations is will have higher book value of debt to equity ratios (LTDTE and STDTE). To control, (a) his difference between the market's valuation of the firm's equity and its book value, scaled by the book value $\{(MV-BV)/BV\}$, is also included as an explanatory variable by D&M. And, (b) was also found to be significantly positively related in case of India in their study. In the present study this variable has not been considered since some of the sample companies are not listed.

Taxation and Capital Structure:

The second important determinant of capital structure is the tax system. The firm's financing choice affects its tax liabilities because the total amount of taxes paid by the firm's investors, at both corporate and personal levels, differs as per the equity or debt securities. Firms attempt to satisfy these preferences by optimally altering their capital structure. Depending on the level of personal and corporate taxes, this optimizing behaviour by firms results in one of two outcomes.

First if tax rates are such that one form of financing (Debt or equity) is unambiguously tax advantaged, then there may exist an optimal debt-equity ratio for each firm that minimizes its total tax and that depends on the firm's tax liabilities. Second, for some tax regimes the aggregate supply of debt and equity securities in the economy may adjust so that individual firms are indifferent between issuing debt or equity. In both cases, individual firms may have an incentive to choose low debt levels if they cannot utilize debt tax shields (DeAngelo and Masulis, 1980).

The relationship between an individual firm's debt level and the measure of non-debt tax shields, depreciation expense over total assets, DEPTA, and estimated non-debt tax shields over total assets (NDTS) can be examined. Although in this study we have considered DEPTA as the NDTS, NDTS itself can be calculated by applying the following formula.

$$\text{NDTS} = \text{PBT} - (\text{PBT} - \text{PAT})/T_c$$

Where,

PBT = Profit before tax

PAT = Profit after tax

T_c = Corporate Tax Rate

It is expected that both the variables, viz. DEPTA and NDTS would be negatively related to measure of capital structure.

2.0 Related Studies on Capital Structure:

Manos, Green and Murinde (2001) have made a study comparing the capital structure of group affiliated firms and independent firms in India. This study confirms that group affiliated firms are significantly different from their independent counterparts, in terms of their capital structure decisions. For example, the results show that the mean as well as median leverage of group-affiliated firms is higher than the counterpart measures for non-affiliated firms. It is found that group affiliation has a strong effect on capital structure decisions such that group profitability has a strong negative effect on the leverage decisions of group-affiliated firms. The authors also find that size, as well as growth, does not matter for the capital structure of group-affiliated firms, whereas these factors are critical for the capital structure decisions of independent firms. Only liquidity has a positive (albeit small) impact on the capital structure decisions of group-affiliated firms while intangibility profitability, group debt and group size have a negative effect.

Mira F.S (2002) has carried out an empirical analysis over a panel data of 3962 non-financial Spanish small and medium enterprises (SMEs). This study reveals that the financing decision in these companies could be explained by the main capital structure theories: Fiscal Theory, Trade –Off Theory and Pecking Order Theory. In Fiscal Theory, the author finds leverage to be significantly negatively correlated with alternative tax shield is like depreciation, and contrary to expectations it is found that taxes are *negatively related* to debt. Size and asset structure are positively related with firm debt level and SMEs with more growth options seem to employ more debt. It is also found that SMEs rely their financing on internal resources instead of turning to outside the firm thus proving pecking-order hypothesis.

In his study on Swedish micro and small firms Heshmati (2001) finds out that expected growth and size have negative effects on leverage.

Prasad *et al* (2001) have made an extensive survey of literature on capital structure with specific reference to developing economies.

Green *et al* (2002) observes that Indian quoted non- financial companies exhibit financial structures which differ to some extent from their OECD counterparts. The authors have found interesting and important differences between quoted and unquoted companies. They observe that in particular, unquoted companies are more heavily reliant on equity than quoted companies. Unquoted companies are also more heavily reliant on internal funds than are quoted companies. Both quoted and unquoted companies have experienced changes in their financial structures which, it seems reasonable to conjecture, were associated with the liberalization of the capital markets in the early 1990s.

Rajan and Zingales (1995) find striking similarity in the debt-asset ratio at an aggregate level across firms in industrialized countries with low external finance. This study is path breaking in contemporary literature.

Bancel and Mittoo (2003) find that the major determinants of the capital structure decision of the European managers are similar to that of the U.S. They suggest that capital structure choice may be the result of a complex interaction of many institutional features and business practices that is not fully captured by differences in the legal systems.

On the basis of data from more than 1000 Chinese listed companies, Huang and Song (2002) find that as in case of other countries, leverage in China increases with firm size, non-debt tax shields and fixed assets, and decreases with profitability and correlates with industries. However leverage decreases with volatility.

Hovakimian *et al* (2003) find that high market-to-book firms have low target debt ratios. They also find that profitability has no effect on target leverage.

In another path breaking study, Booth et al. (2001) have used a sample of 10 developing countries: Brazil, India, Jordan, Korea, Malaysia, Mexico, Pakistan, Thailand, Turkey, and Zimbabwe. In marked contrast to the previous such studies the authors claim that the factors pertaining to the issue of the determination of capital structure in the United States and the European countries are also potent enough in explaining financial decisions in developing countries despite the profound differences in the institutional frame work in which they operate.

Bhaduri (2002) shows that the optimal capital structure choice is influenced by factors such as growth, cash flow, size, asset structure and product and industry characteristics. This study is based in sample of Indian corporate. Table #1 summarizes the determinants of capital structure as per various known/unknown theories.

Variable (s)	Measure	Theory	Expected Sign
Asset Tangibility	NFATA	Information Asymmetry	+ve
Growth	% Change in Sales or CAGR in Sales	Agency	-ve
Size	Log of Sales or Total Assets	Information Asymmetry	+ve
Earning Volatility	Variation in operating income	Not specific	-ve
Profitability	Return on Assets	Pecking Order Hypothesis Information Asymmetry	+ve
Non Debt Tax Shield	Depreciation to Total Assets	Not Specific	-ve
Tax	$1 - [\text{Earning after Tax}/\text{Earning before Tax}]$	Not Specific	+ve
Age	Age since incorporation	Information Asymmetry	+ve
Uniqueness	Research & Development Expense to sales or selling and Advertisement Expense to Sales	N/A	-ve

Table 1: Determinants of Capital Structure – What Theories Implies? (Source : Author's Compilation)

3.0 Sample, Data and Variables Considered for the Present Study:

Only profit-making manufacturing central public sector enterprises have been considered for this study. This list of 38 Government-backed enterprises includes both listed and unlisted companies. Hence some of the variables that requires the company's market value of share have not been considered. Out of all the listed Government-backed enterprises, in several of them regular trading does not take place. Table – 2 provides the list of variables and the explanation of the same that are considered for the present study. All the variables have been averaged over a period of fourteen years ending March 2003. The data have been collected from the Prowess database of CMIE. Linear Regression has been used to find the factors affecting the capital structure.

Variable	Explanatory Definition
TBTA	Total debt to total assets
LTBTA	Long term debt to total assets
STBTA	Short term debt to total assets.
TBTAI	Total debt to (Total debt + Net worth)
LTBTAI	Long term debt to (Long term debt + Net worth)
STBTAI	Short term debt to (Short term debt + Net worth)
ROA	Earnings before interest and taxes (EBIT) to Total assets
SIZE	Log of Total Assets
TAX	1 – PBT/PAT or Tax paid to PBT
NDTS	Depreciation to Total Assets
VOL I	Coefficient of variation of Return on Total Assets
VOL 2	Coefficient of Variation of Return on Sales
NFATA	Net fixed assets to Total assets
GROWTH	CAGR of Sales between 1989/03 and 2003/03

Table 2: Variables-Definition

4.0 Findings and Inferences:

Table – 3 provides the descriptive statistics of the variables considered in this study. It is revealed that Government-backed enterprises borrow less. The average total debt to total borrowing varied between 0% and 52%. Very high portion of the borrowings is from long-term sources. Short-term borrowing is negligible. The regression was run for the measures of capital structure – TBTA, TBTAI, LTBTA, LTBTAI, STBTA AND STBTAI. Whiles results were found for the first four measures of capital structure, no significant results were found by the regression method for the two measures of capital structure: STBTA and STBTAI.

Variable	Mean	Minimum Value	Maximum Value	S.D.
TBTA	0.1741	0.00	0.52	0.13
LTBTA	0.1372	0.00	0.52	0.12
STBTA	0.0369	0.00	0.20	0.05
TBTAI	0.2735	0.00	0.59	0.17
LTBTAI	0.2238	0.00	0.56	0.16
STBTAI	0.0774	0.00	0.39	0.09
ROA	0.1147	0.02	0.30	0.05
SIZE	7.1343	7.38	11.34	1.97
NFATA	0.3475	0.01	0.85	0.23
NDTS	0.0273	0.00	0.06	0.02
TAX	0.2619	0.002	0.54	0.11
GROWTH	0.0857	-0.14	0.38	0.09
VOL 1	0.0392	0.01	0.16	0.03
VOL 2	0.0624	0.02	0.78	0.13

Table 3: Descriptive Statistic

Asset Structure as determinant of capital structure:

Agency theory suggests that firms with large fixed assets have a comparative disadvantage in obtaining long-term debt, whereas firms with high sales relative to fixed assets have a comparative advantage in borrowing over shorter periods. This suggests that NFATA is positively related to long-term indebtedness LTDTE. In the present study we find NFATA to positively relate with all measures of leverage studied.

Effect of Government-backed enterprises' excess cash flow on capital structure:

In this study, we have used the return on assets (ROA) to measure the firm's ability to generate capital internally. As expected by theory, we find ROA to be negatively related to all the measures of leverage. It is implied that the profitable Government-backed enterprises borrow less.

Taxation vs. Capital Structure:

Impact of tax effects on capital structure is measured through NDTS and TAX. There is no significant relationship between NDTS and any measure of leverage. Contradicting the theory, the tax and all measures of leverage are negatively related and the relationship is statistically significant. However the result is similar to that found in Booth et al (2001). This suggests that the managers of Government-backed enterprises have no incentive to take the advantage of tax shield and go for proper leverage. They do not attach any importance to tax effects while deciding on capital structure.

In this study, no significant relationship was found between GROWTH and RISK. Size was positively related only with TBTA1. This implies that size does not matter much for the Government-backed enterprises to borrow. It could be due to the sheer nature of the ownership. Banks and FIs would not mind much while extending debt to Government-backed enterprises.

$$\text{Leverage} = \alpha + \beta_1 \text{ROA} + \beta_2 \text{SIZE} + \beta_3 \text{NFATA} + \beta_4 \text{NDTS} + \beta_5 \text{TAX} + \beta_6 \text{GROWTH} + \beta_7 \text{VOL 1} + \beta_8 \text{VOL 2} + U \dots\dots\dots(\text{MODEL -I})$$

Variables	Dependent Variables (Measures of Leverage) – restricted			
	TBTA	TBTA1	LTBTA	LTBTA1
Constant	0.266 (0.046) ₁	0.292 (0.099) ₁	0.193 (0.040) ₁	0.333 (0.068) ₁
ROA	-1.039 (0.294) ₁	-1.034 (0.432) ₂	-0.893 (0.257)	-1.241 (0.439) ₁
Size	.180 *	.0337 (.011) ₁	0.025 *	0.117 *
NAFTA	0.356 (0.064) ₁	0.308 *	0.378 (0.056) ₁	0.387 (0.096) ₁
NDTS	-0.062 *	0.169 *	-0.137 *	-0.077 *
Tax	-0.370 (0.188) ₁	-0.534 (0.186) ₁	-0.325 (0.103) ₁	-0.386 (0.177) ₂
GROWTH	0.094 *	0.134 *	-0.02 *	-0.045 *
VOL 1	-0.036 *	0.125 *	-0.007 *	0.191 *
VOL 2	0.091 *	-0.025 *	0.165 *	0.140 *
RSQR	.81	.83	.82	.81
ADJRSQR	.76	.78	.77	.77
F Value	15.51	15.098	16.775	17.017
N	38	38	38	38

Table 4: Parameters and their significance for regression equation represented by MODEL -I. 1 & 2 : Significant at 1% and 5% respectively.

* Results are not significant.

The Dublin Watson (DW) statistics are: TBTA= 2.008, TBTAI= 1.972, LBT A = 1.975, LBT AI= 1.982.

4.1 Testing for a Structural Change

When we use a regression model for a longer period of time duration, it may so happen that there is a structural change in the relationship between the regressor and the regressands. That is to say that the parameters of the equation may not remain the same through the entire time period. This challenges the robustness of the equation and we cannot be sure that there has been some changes in the parameters in between . To verify it we divide the data into two sub data and run the regression and check if there has been any change in the intercept as well as the slope coefficients over the entire period.

I used the Chow test to check the parameter stability of the regression model.

The possible regressions are:

Time period (90/96)

$$\text{LEVERAGE} = \alpha + \beta^1_1 \text{ROA} + \beta^1_2 \text{SIZE} + \beta^1_3 \text{NFATA} + \beta^1_4 \text{NDTS} + \beta^1_5 \text{TAX} + \beta^1_6 \text{GROWTH} + \beta^1_7 \text{VOL 1} + \beta^1_8 \text{VOL 2} + U$$

Time period (97/03)

$$\text{LEVERAGE} = \alpha + \beta^2_1 \text{ROA} + \beta^2_2 \text{SIZE} + \beta^2_3 \text{NFATA} + \beta^2_4 \text{NDTS} + \beta^2_5 \text{TAX} + \beta^2_6 \text{GROWTH} + \beta^2_7 \text{VOL 1} + \beta^2_8 \text{VOL 2} + U$$

Time period (90/03)

$$\text{LEVERAGE} = \alpha + \beta_1 \text{ROA} + \beta_2 \text{SIZE} + \beta_3 \text{NFATA} + \beta_4 \text{NDTS} + \beta_5 \text{TAX} + \beta_6 \text{GROWTH} + \beta_7 \text{VOL 1} + \beta_8 \text{VOL 2} + U$$

To test for the structural changes, we can make use of the chow test to determine the parameter stability of the model.

Conditions when the Chow test is applicable:

Condition 1: $\sigma_1^2 = \sigma_2^2$ error variances must be same for the two regressions.

We can use the the estimates of the variances from the RSS (refer to ANOVA tables) given in the regression. Then it can be shown that :

$$F = \sigma_1^2 / \sigma_2^2 \text{ follows } F_{[n-k],[n-k]}$$

Where,

$$N= 38, k= 9$$

For Chow Test :

Consider the Residual sums of square (RSS) for both the case (restricted and unrestricted) and using the F test to determine if the parameters in both the cases are equal or not

(Hypothesis : all the parameters in both the cases are the same).

$$RSS_{UR} = RSS_1 + RSS_2 \text{ with } df = n_1 + n_2 - 2k$$

Then,

$$F = \frac{(RSS_R - RSS_{UR}) / k}{(RSS_{UR}) / (n_1 + n_2 - 2k)} \sim F[k, n_1 + n_2 - 2k]$$

$$K= 9, n_1 = n_2 = 38$$

Results

Case # 1 : when LEVERAGE = TBTA

ANOVA (restricted)						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.652322405	8	0.581540301	15.51917	1.38E-08
	Residual	1.85	29	0.037472395		
	Total	6.502322405	37			
A	Predictors: (Constant), VOL2, NDTs, TAX, GROWTH, ROA, NFATA, SIZE, VOL1					
B	Dependent Variable: TBTA					

Similarly the ANOVA for the two unrestricted Equations are :-

ANOVA (Unrestricted)						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	4.718822	8	0.943764	24.1207	5.42E-10
1	Residual	1.252056	29	0.039127		
	Total	5.970878	37			
a.	Predictors: (Constant), Vol2, ROA, size, NFATA, Vol1					
b.	Dependent Variable: TBTA					

And,

ANOVA(unrestricted (9803))						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	4.6359	8	0.8272	20.1207	2.00E-03
1	Residual	1.023	29	0.0294		
	Total	5.6589	37			
a.	Predictors: (Constant), Vol2, ROA, size, GROWTH, Vol1					
b.	Dependent Variable: TBTA					

Hence,

Condition test: F test gives a value 1.04 which is less than the table value at 5% . Hence we have no evidence to reject the null hypothesis that the error variance are same in both the sub samples.

Hence, we can go ahead with the Chow Test.

Outcome of the Chow test :

Calculating the F – statistic, we get a value of (1.204) is less than the tabulated value (5% level).

Hence we can say that the parameters are not different for both the restricted and unrestricted case.

Similarly for the other cases i.e. for Leverage = TBTA1, LTBT A, LTBT A1 the value of the F statistic is less than the tabulated value at 5% . Hence we can say that the structure is stable for the sample data taken into consideration.

The comparison table (Table-5) provides the outcome of the empirical analysis as compared to the available theoretical deductions.

Variable	Measure	Theory	Expected Sign	Signs obtained
Asset Tangibility	NFATA	Information Asymmetry	+ve	+ve
Growth	% Change in Sales or CAGR in Sales	Agency	-ve	+ve
Size	Log of Sales or Total Assets	Information Asymmetry	+ve	insign.
Earning Volatility	Variation in operating income	Not specific	-ve	insign.
Profitability	Return on Assets	Pecking Order Hypothesis Information Asymmetry	+ve	+ve
Non Debt Tax Shield	Depreciation to Total Assets	Not Specific	-ve	insign.
Tax	$1 - [\text{Earning after Tax}/\text{Earning before Tax}]$	Not Specific	+ve	-ve
Age	Age since incorporation	Information Asymmetry	+ve	N.A
Uniqueness	Research & Development Expense to sales or selling and Advertisement Expense to Sales	-----	-ve	N.A

Table 5: Comparison between empirical findings and Capital Structure Theories

5.0 Conclusion

The changing pattern in the financing is observed in case of the Government-backed enterprises with reforms in the Indian economy and the public sector in particular accompanied by disinvestments. The Government-backed enterprises have got the challenge to access the market for both equity and debt finance. The gradual reduction in the interference, otherwise known as increasing autonomy to them will make this task easier. The Government-backed enterprises has to re-look at the financial leverage they have at present and change suitably. In this context, the present study made one of the first attempts to know the factors that affect their capital structure. In confirmation with theory, specifically with pecking order hypothesis, the leverage is found to be negatively related to profitability, i.e. the Government-backed enterprises use the internal accruals first for the needs of expansion. The tangibility measured by the ratio of net fixed assets to total assets is found to be positively related to leverage. In contrast with theory, the tax rate is negatively related to the leverage. However such result has also been found in Booth *et al* (2001). In that study in almost all the sample developing countries the tax rate is found to be negatively related to leverage.

The present study is one of the initial studies on sample of central Government-backed enterprises in India. One can possibly enlarge the sample or modify the same by taking the Government-backed enterprises listed in other markets to capture the effect of the market on the capital structure. Further the structure of the related companies from the private firms can be determined and compared to find if any variation exist in both the cases.

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APPENDIX - I

Name of the Companies	
Balmer Lawrie & Co. Ltd.	National Fertilizers Ltd.
Bharat Dynamics Ltd.	National Hydro-Electric Power Corps. Ltd.
Bharat Earth Movers Ltd.	National Mineral Devp. Corp. Ltd.
Bharat Electronics Ltd.	National Thermal Power Corpn. Ltd.
Bharat Heavy Electricals Ltd.	Neyveli Lignite Corp. Ltd.
Bharat Petroleum Corp. Ltd.	Nuclear Power Corpn. Of India Ltd.
Chennai Petroleum Corpn. Ltd.	Oil & Natural Gas Corpn. Ltd.
Coal India Ltd.	Oil India Ltd.
Dredging Corpn. Of India Ltd.	P E C Ltd.
Educational Consultants (India) Ltd.	Shipping Corpn. Of India Ltd.
<i>Engineers India Ltd.*</i>	Telecommunications Consultants India Ltd.
G A I L (India) Ltd.	Tide Water Oil Co. (India) Ltd.
Garden Reach Shipbuilders & Engineers Ltd.	Western Coalfields Ltd.
Hindustan Paper Corpn. Ltd.	
Hindustan Petroleum Corpn. Ltd.	
<i>Hooghly Printing Co. Ltd.*</i>	
I B P Co. Ltd.	
Indian Oil Blending Ltd.	
Indian Oil Corpn. Ltd.	
Indian Rare Earths Ltd.	
<i>Ircon International Ltd.*</i>	
Kochi Refineries Ltd.	
Mahanagar Telephone Nigam Ltd.	
Manganese Ore (India) Ltd.	
National Aluminum Co. Ltd.	

**Data not adequate for computation henceforth not considered for computation.*

Importance of Technology Management as a Mainstream Area of Specialization: An Exploratory Research

Debabrata Sengupta¹

Abstract

With the business environment becoming increasingly digitally driven, it has become essential for business managers to acquire skills of Technology Management to be able to identify opportunities and threats, and take organizational decisions accordingly. These skills need to be inculcated into aspiring professionals during their academic training. In this context, this research paper explores the importance, roles and deliverables of technology in general management and the emerging data driven business models. It also highlights skills in the area of technology management which industry and general management professionals have started expecting from managers across levels, some key organizational practices adopted to maintain competitive advantage by leveraging technology and successful leadership practices in tracking technology trends and adopting them to core operational processes.

1.0 Introduction

Technology has become by far the most disruptive force in business since the early 20th century. During the early part of the 20th century, scientist-innovators like Thomas Edison and Nikola Tesla, and business-innovators like Henry Ford and William Boeing completely transformed the socio-economic landscape of the western hemisphere. These pioneers, and many more like them, excelled at adapting technology for products of mass consumption in ways that created tremendous value.

This process of value creation accelerated many-fold with the advent of the digital age in the latter part of the 20th century. New business giants were created out of similar technological innovation and adoption. The common link in all these success stories was the ability of the business leaders to identify technology trends that could have wide ranging, significant impact and capitalize on them. The significance of the impact of these landmark technologies are enumerated in the following ways:

- Transformational impact on consumer habits leading to long term, profitable business cases
- Ability to support a wide range of associated product
- Products and services to create a mutually synergistic ecosystem
- Globally applicable use cases without the limitations of geographic, social or political factors which can typically restrict expansion

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Technology has become all-pervasive in a consumer's life and the impact of this is being felt by companies across industry segments, irrespective of whether they are a technology company or not. This is because technology has become an essential ingredient of not just product development, but of delivery, distribution and customer interface as well. For example, a high touch-feel experience industry like hospitality and restaurants are increasingly providing technology products like WiFi connectivity, technology enabled services like online booking and ordering, and technology enabled interfaces like Augmented Reality hotel/room guides.

The wide scope and inter-operability of technology are providing newer opportunities to brands who are now are endeavouring to become more and more experiential, multi-modal and intuitive. While at the high-end urban domain, tech giants like Amazon and Alibaba are experimenting with "cashier" less stores, at the low-end rural domain, financial services majors like Fullerton India are using mobile phone connectivity to provide faster micro-loans to more people in India's hinterlands.

Organizations like Samsung, Visa and Toyota are able to sustain their value by being extremely user focused and tracking technology trends to stay ahead of the curve.

- Samsung was early to spot the rise of open smartphone OS and became the de facto growth vehicle for Android in its early days. As a result, they were able to build one of the strongest smartphone brands which continues to hold its ground in the face of formidable challenges from newer brands.
- Visa was quick to spot the trend of digitization of payments and transitioned seamlessly from 'zip-zap' machines to cloud based protocols. This enabled them to retain their market share even during the ecommerce revolution since they provided a unified back-end infrastructure to all banks and plastic money companies for both online and offline shoppers.
- Similarly, Toyota has been at the forefront of the Electric Vehicle (EV) and Connected Mobility trends. The Prius was the only truly successful electric hybrid passenger car to be mass produced and sold globally. They are also bringing cloud based connectivity innovations like the Toyota Smart Centre which aims to link people, cars and homes using multiple wireless connectivity and sensor technologies like GPS, Bluetooth, LTE and heat sensors.

Conversely, industry-leading organizations like Kodak and Blockbuster have either fallen from positions of market leadership or even ceased to exist as they failed to identify changing technology trends. These organizations had ample access to technology and the resources to invest in them. However, they failed to assess the impact of changing technology on consumer preferences, and therefore became redundant.

In this scenario, it becomes extremely important to bring technology management into the top tier of essential managerial skill-sets. The younger generation of digital natives are already waking up to this need and opportunity. In a research on MBA students published in August 2018 by CarringtonCrisp (an education research & consulting firm) in 2018, Technology Management clocked in as the number two priority learning area along with strategy. It is second only to Leadership Skills and has, for the first time, overtaken Entrepreneurship in ranking.

The critical questions to answer are whether organizations are making space of technology management in their hierarchy, whether they are recognizing this as an area of specialization and whether enough is being done to inculcate a wider awareness of new technologies and their impact on the marketplace.

2.0 Research Hypothesis

Technology management and trend tracking as a management skill is still not considered as an area of specialization which requires dedicated efforts and manpower. In most organizations, it is looked upon either as the domain of IT departments or the responsibility of senior leadership to identify key trends influencing business. The CIO expected to take on the responsibility, which often results in internal or process oriented technology focus. Digital transformation, though a buzzword nowadays, is restricted mainly to marketing communication, infrastructure / production efficiencies and analytics. It is still not central to the business, thereby not getting dedicated manpower or inculcation as a process down the management hierarchy.

In the current business environment in India, technology management is being looked at primarily from an innovation standpoint. Large organizations across sectors have instituted the position of a Chief Innovation Officer. In most of these cases, professionals with an engineering/technical background are preferred for these positions.

However, it is very important to approach technology management from a customer standpoint, and therefore understanding of consumer behaviour is of critical importance. Viewed from this perspective, it has to be driven as much by business as technology departments in an organization. Ergo, professionals in non-technical positions (sales, marketing, HR, finance, strategy etc) need to be able to understand application and use cases of technology.

Not having a structured, multi-disciplinary approach to technology management can lead to substantial loss of business opportunities and subsequent downturn of overall performance.

2.1 Technology Management: An Overview

Prof Khalil of University of Miami and Prof Shankar of IIT Delhi define Management of Technology (MoT) as “an interdisciplinary field that integrates science, engineering, and management knowledge and practice”. They further go on to elaborate on the topic:

“The focus is on technology as the primary factor in wealth creation. Wealth creation involves more than just money; it may encompass factors such as enhancement of knowledge, intellectual capital, effective exploitation of resources, preservation of the natural environment, and other factors that may contribute to raising the standard of living and quality of life. Managing technology implies managing the systems that enable the creation, acquisition and exploitation of technology. It involves assuming responsibility for creating, acquiring, and spinning out technology to aid human endeavours and satisfy customers’ needs. Research, inventions, and development are essential components in technology creations and enhancement of technological progress. However, more important for the creation of wealth is the exploitation or commercialization of technology. It is only when technology is connected with a customer that its benefits are realized.”

The key aspects highlighted very aptly by Khalil & Shankar are that ***technology needs to be adapted to customer requirements and brought to the market to create wealth***. This is really the most significant challenge facing organizations across sectors and geographies today.

However, this statement actually brings together three separate fields of specialization as the drivers of technology management - technical/engineering, marketing and finance. Creation of technology is the sole domain of engineering and cannot be replaced. At the same time, consumer insights and analysis is the specialization of marketing professionals. Both of these specializations need support from finance professionals to evaluate commercial profitability. The absence of any one of these specializations weakens the chances of success significantly even if the other two are strong.

In many cases, technologists are aware of new trends in their field, but are unable to translate the applicability of the same in the consumer space. This is because of a typical chicken and egg situation, where on one hand the consumer is not able to articulate his/her requirement, as they are not aware of the possibilities; on the other hand, the technologist is not able to decipher actionable use cases, as there are no concrete data points.

This phenomenon manifests itself in inter-departmental dynamics as well. Large organizations have very capable teams of specialists organized into functional departments, which can be broadly categorized into two sections (for the purpose of this paper) - technical (engineering, production, IT, R&D etc) and non-technical (sales, marketing, customer care, HR etc). These two sections often tend to work in silos. Technical teams spend very little time in the market to get a deeper understanding of customers. Conversely, non-technical teams spend very little time discussing trends and possibilities with their technical teams.

The importance of MoT is in multi-disciplinary or inter-disciplinary areas, beyond the confines of a technologist's viewpoint. Burgelman, Christensen & Wheelwright state that, "...general managers need not have backgrounds in science or engineering, but they do need to invest significant effort in learning to understand the technologies important to their business. They must also identify reliable and trustworthy sources of technical advice. Most importantly, they must be able to frame the strategic questions in relation to technology."

Mapping the cross impact of technology trends and consumer habits to organizational strategy is often left to the outlook of a few senior managers without any systematic framework or support. Managers are also consumers, and as consumers, they are experiencing technology applications of different products on an everyday basis. Successful managers are able to leverage their everyday experiences as guideposts for enhancing their own business deliveries. They are able to first distil the experience down to distinct processes and elements and then analyse them for application in other areas. This skill is essential, as technology in itself is almost never unidirectional. With the same base technology, it can be applied to innumerable use cases.

A case in point is face recognition and biometric identification technology, which has been used extensively for access control in high security areas, have now evolved into one of the hottest tools for automated emotional analysis used for content testing by media companies. What is required to be able to use technology innovatively for gaining a competitive edge, is an innovative mindset rather than technological or technical expertise. The latter comes into focus at the development stage.

Given that, technology is now an essential ingredient across functions; organizations need to integrate disparate systems in a structured manner to achieve a common goal. For this, individual process owners across functions should be able to synergize available resources for maximum efficiencies. This requires approaching the discipline of Management of Technology in a structured fashion for managers across levels.

Commenting on the need for a structured approach to Management of Technology (MOT) in "**Achieving The Competitive Edge Through Integrated Technology Management**", Gerard H. Gaynor states,

"What MOT at the academic level implies: developing an understanding as to how all of the technologies of a business can be integrated, directed toward some specific objectives, and optimized with all other business resources. It deals with the ways an organization manages its technology collaboratively, noncompetitively, and synergistically."

Gaynor points out very insightfully, that technology needs to be viewed as “... *the knowledge and resources that are required to achieve a goal*”. The goal-orientation of investing in technology needs to be robust to avoid the pitfall of running after every new technology to grab the headlines. Applicability to the business, feasibility of rapid adoption, cross-functional process interface orientation and financial impact need to be evaluated very carefully before implementation. This process is a team effort and not individual centric.

An illustration of goal based technology deployment in frontline operations is the use of Artificial Intelligence (AI) by Indian FMCG major, Marico Limited¹⁰. An integrated inventory management system was deployed specifically to reduce inventory stocks. It has brought together multiple technologies like geo-tagging, smart devices, ERP and data analytics in a seamless process, which has helped, reduce inventory levels by 75% and frontline manpower costs by 20%. Sales executives carry PDAs loaded with an application for taking orders on location at retailers’ premises. The application on the online smart device automatically geo-tags the order entry for faster verification and order placement, which is passed on the ERP system to initiate the order replenishment cycle. Data gathered through this process was analyzed to predict performance of individual channel partners. The sales team to engage more meaningfully with channel partners uses this data. A spin-off of this deployment has been predictive and prescriptive analytics, which has helped Marico to launch new products in a combined offline-online mode with significant success.

A similarly varied and distributed team is required to keep the product offerings relevant for the end user through a continuous feedback-evaluation-development loop. Once a process or product is deployed, the end user experience needs to be monitored very closely. A good experience will encourage them to evolve multiple use cases beyond those originally planned by the development team. In the post deployment period, three categories of monitoring is mandated:

- Objective measurement of planned performance parameters
- Subjective measurement of the users’ experience in terms of likeability and relevance
- Observation of use cases in which the technology is being utilized by users

This requires a combination of expertise in technological, business and behavioural areas – which is possible only when a cohesive team comes together to develop and evangelize technology as a strategic asset.

MoT has become a key success factor across industries and functions. Therefore the need to have a structure around its approach and execution has become an essential skill set for the modern business manager in the VUCA (Volatile, Uncertain, Complex, Ambiguous) world.

2.2 Role of Technology in Commercial Organizations

Perhaps the main reason why technology management is still not considered as an area of specialization is that the role to be played by technology is not clearly defined in management hierarchies and strategies for most organizations. Even in the case of some old economy large organizations where technology is the core product, extreme focus on the technology itself instead of the customer needs that it was meant to cater to, leads to stagnation. From an organizational perspective, technology is an enabler of different strategic or operational requirements:

2.2.1 Product Differentiation

Technology has been used as a platform for innovations in products and services across industries. The race to create a better product which cannot be matched by competition has seen investments in both in-house and outsourced Research & Development leading to hugely profitable patented technology.

Example 1: Sony developing and launching the Walkman changed the course of the music device industry globally. Akio Morita – co-founder and then CEO of Sony - is famously quoted to have asked his engineers to come up with a portable music cassette player which could be fitted into the jacket pocket of his suit. Steve Jobs went one step further in asking for the iPod to be small enough to fit into his jeans pocket.

Example 2: Nike has a state-of-the-art research centre in Oregon - with over 40 researchers with doctorates/ masters degrees in the areas of biomechanics, physiology, biomedical engineering, physics, math, kinesiology and systems science – to be able to stay ahead of competition through technology backed innovation and performance improvements. They also have research partnerships with major universities across Asia, Europe and North America.

2.2.2 Process Productivity Improvement

Technology has been at the heart of improving process and resource (machinery, materials, manpower) productivity, thereby maximizing output with given resources. It has acted as the enabler which helped resolve problems and shortcomings faced during the production cycle of physical goods and delivery cycle of services. Various methods like automation, digitization, machine learning, telecommunication and telemetry was deployed for continuous process improvements.

Example 1: The Japanese automotive giant Toyota transformed the auto manufacturing with the Toyota Production System. It is a socio-technical system of continuous improvements through eliminating wastage, equating workloads and deploying technological innovation to maximize productivity. This model was replicated across other manufacturing sectors as well in various forms to maximize resource utilization.

Example 2: Logistics start-up Rivigo has made inroads into the traditional Indian logistics space by using a combination of big data, IoT, advanced analytics and telecom to maximize asset utilization and safety. To ensure that the vehicles are on the move at least 16 hours a day without the risk of driver fatigue, a system of ‘relay-drivers’ has been developed. This involves a pre-planned route map tracking of the vehicle journey wherein it is handed over to the next driver in the chain at designated junctures.

2.2.3 Customer Experience Enhancement

With digitization and virtualization technology gaining momentum, focus of business globally is moving from product differentiation to experience enhancement. Technology is leverage to deliver immersive and intuitive customer experiences all through the customer life cycle. Customers expect brands to be present at the time of felt need, and online data is helping the latter to map customer journeys and enhance ‘moments of truth’. Customer journey mapping was digitally enhanced and was validated by organizations across sectors. In the BFSI sector, organizations are tracking customer behaviour and influencers with a much wider lens. This is helping them build in value additions for customers through brand alliances with companies in non competing but complementary sectors. The result is a seamless, holistic and habit-forming service experience for customers, thereby enhancing brand loyalty.

Example 1: Ecommerce companies like Amazon are constantly looking to make the shopping experience more intuitive through analysis of consumers’ online behavior and upgrading systems and interfaces accordingly. Amazon has added smartphone specific features like camera image based search, location specific offers and mobile recharge options exclusively to its mobile app to customize the experience for ‘mobile first’ and ‘mobile only’ users who currently outnumber desktop users in India.

Example 2: Retail apparel shopping has gone high-tech at Tesco, thanks to Virtual Mirrors, which allow customers to stand in front of a mirror which displays their reflection with the clothes of their choice. This enables them to try out as many clothes options that they want virtually and instantly, without the hassles of actually changing into them. Cosmetic giant Maybelline for ‘virtual makeup’ through an online app has adopted similar technology.

2.2.4 Cost optimization

Both manufacturing and services require deploying complex supply chains, especially in the case of geographically distributed set-ups. Every link in the chain needs to be optimized in sync with the preceding and following links in the chain. Technology is used in this regard in terms of analysis, automation, support, logistics and coordination. The end objective would be to minimize the cost of the entire supply chain or delivery process.

Example 1: American insurance giant Aon has been deploying automation and virtualization in a big way in their IT systems to support their increasingly complex and volatile business environment. Data gathering, computation and storage on a massive scale is pivotal to their business. All Data Centres have been converted from traditional server farms to cloud centric Software Determined Data Centres (SDDC), thereby reducing operational costs globally.

Example 2: Digitization has reduced the cost of making movies prints to 20% of analog prints and helped reduce losses from piracy. Digital prints from producers are coded and transmitted through satellite connections directly for display at theatres. This eliminates the need for costly physical transportation of prints which were prone to heavy pilferage and piracy related costs. It also helped multi-screen theatres to optimize show timings on the go which minimized costs of low occupancy

2.2.5 Monitoring and Control

Operational monitoring and control is essential to achievement of targets in business environments which are subject to multiple external and internal influences affecting them. Technology based monitoring systems ensure timely, accurate and unbiased data capture which can be effectively used for control and course correction measures. While it is easier to monitor operations objectively in manufacturing set-ups, it is much more difficult in the case of services where a number of subjective aspects like interface experience come into the picture. Monitoring systems need to be embedded in processes right at the development stage for maximum efficiency.

Example 1: Mundane operational monitoring requirements like employee attendance tracking are increasingly becoming automated with biometric scanner based access systems. These are combining the requirements of safety with employee movement for fully integrated, efficient systems covering processes all the way to payroll management. Integration of diverse systems are adding even greater value.

Example 2: Sensor based asset monitoring systems have been deployed by large mobile network operators like Indus Towers. Inconsistent power availability to run BTS in remote areas forced Indus to have diesel generators as back-up, which regularly needed fuel top-ups. Sensors with remote access helped Indus Towers to monitor performance parameters like the generators' run time, fuel consumption, output levels, temperature and lubricant levels. These formed the basis for maintenance scheduling, refueling team's route map planning and asset ROI tracking.

2.2.6 Decision Support System

Managerial decision making is heavily dependent on timely, comprehensive and accurate data analytics (internal & external) and insights. Integrated information and analysis systems require a combination of data gathering, storage, computational and communication capabilities. Automation of standardized report generation and communication has evolved into Artificial Intelligence and Machine Learning based insights generation to support real-time decision making. One of the main ingredients of this new ecosystem is the gathering of data from a very wide range of sources and analyzing them specific to situations, stakeholders and business requirements.

Example 1: Market research agency Nielsen does advertising and content testing using eye movement tracking, emotion mapping and biometrics which can accurately assess the reaction of target audience to audio-video content. Reactions of sample customers are videographed while they watch the content. This recording is run through an analytical software which identifies levels of engagement, likes-dislikes and emotions generated on a second by second basis, which when mapped with the exposed content, indicates whether the content will be effective or not – and therefore whether it should be modified before media release.

Example 2: Airtel sends real-time sales data specific to each sales manager on their mobile phones. This data is sourced from the IN and back-end activation systems, collated as per product portfolio and ongoing promotions, segregated as per location and hierarchy, and sent out as a message in a standardized format. This helps the sales managers to coordinate on-ground activities and direct their teams accordingly in real time.

2.2.7 Key Trends in Leveraging Technology as a Management Tool

Every organization and professional will have a wish-list of technology products / services to enhance efficiency and productivity, with specific regard to the points elaborated in the section on “Role of Technology in Commercial Organizations”. Majority of these are meant to enhance the supplementary processes and services, including managerial decision-making, support process automation, employee productivity enhancements, customer engagement, stakeholder interactivity and data analysis.

2.2.8 Rise of Technology Application Generalists

Digitization is the most significant technology trend impacting corporates. With businesses becoming digitally powered across industries, professionals are expected to leverage its power to enhance organizational KPIs (Key Performance Indicators). The general consensus is that *professionals across disciplines today are expected to be conversant with technology in terms of usage and applicability even if they don't possess technical skill* from educational qualifications.

The technology teams within organizations continue to be the de facto custodians of all technology assets as well as technology strategy, as ultimately they are responsible for ensuring consistent operational deliveries technology platforms and tools. However, every functional area, especially senior management, is expected to be up to date on technology trends and the opportunities that they throw up for the organization. This identification of opportunities powered by technology is the primary responsibility of the business teams.

Mr. Sudham Ravinutala of Luminous Power Technologies, echoes this trend – “... all departments are responsible for proactively exploring what serves/suits their departmental needs best.” For him, technology is a means to an end, and more often than not, the technical team plays a supporting role to the lead taken by the business team in benchmarking technology adoption in external stakeholder facing environments. For this to happen effectively, general management and business teams need to get into a habit of constantly updating themselves on developments in the market as well as the overall business environment. This requires an analytical and innovative mindset to formulate a suitable structure for leveraging technology trends. It is essential to be able to match technology features and capabilities to business trends and requirements. According to him, with the increase in scope of business responsibility, the importance of tracking and evaluating both internal and external tech-driven opportunities keeps increasing from the point of view of sustaining value growth.

According to Mr. Rajat Mathur (*Head – Group Loyalty Marketing & Customer Analytics, Future Group*), a “reasonable appreciation of technology” is seen as a definite advantage during a candidate’s selection process into a marketing team. The expectation is these professionals will be able to add greater value to the organization. He goes on to quantify the expectation as, “Ideally, 80% business + 20% technology”. The critical requirement is to be able to sift through a lengthy wish-list and identify areas in which technology enablement will ensure significant ROIs. Therefore a critical understanding of the key levers of business excellence is a prerequisite for effective selection of the right tools. In many cases, existing technologies can be developed further to derive greater value. This development can either be in the form of creating better tools/systems with existing technology standards, or layering existing technology platforms with synergistic applications which may be sourced from a third party. In the latter cases, support from the technology team for strong systems integration becomes a key success factor. However, predicting technology changes and planning for obsolescence is important to ensure business continuity and competitive advantage.

2.2.9 Technology Enabled Customer Centric Organizations

The digital ecosystem has enabled businesses to capture data about customers from a very wide range of sources on a continuous basis. While consistent data collection and analysis has always been one of the hallmarks of successful organizations, the trend currently is an increasing focus on multi-dimensional, real time data. This allows for greater insights into customer behaviour and faster reaction times to trends. As a consequence, *organizations are structuring themselves around a uniform set of customer data points for greater operational alignment.*

It is pertinent to note over here that real time data is more useful for monitoring execution in sectors with long gestation time for new products and innovations (example: shipping, energy, education).

Knowledge Management Systems have been the pivot for data based customer centricity for a long time now. According to Haag, Baltzan & Phillips⁷, “*Knowledge Management involves capturing, classifying, evaluating, retrieving, and sharing information assets in a way that provides context for effective decisions and actions*”. The critical words here are ‘context’ and ‘effective’. Creating a context for business in the customers’ ecosystem and structuring the organization for effective execution around this pivot is a key success factor. They further go on to state, “*Knowledge can be a real competitive edge for an organization. Information technology can distribute an organization’s knowledge base by interconnecting people and digitally gathering their expertise... knowledge management requires that organizations go well beyond providing information contained in spreadsheets, databases and documents*”.

It is very important for business managers to understand and adapt to the transformation of data analytics brought about by big data capabilities. Earlier, business managers would define the data points pertinent to their area of operation, which would be captured in a structured format into a data warehouse. A given set of analytics tools would be applied on them to derive insights. Even when traditional database models evolved into Relational Databases, the basic model of analysis was based on and restricted to a defined set of objective and structured data sets. Subjective data based insights was the realm of market research based on one-on-one interactions. Most of the insights therefore were with varying degrees of lag time.

This model has undergone a complete transformation with the advent of big data, wherein both structured and unstructured data can be stored and analyzed - in real-time if required. For example, customer insights for a travel services company is no longer restricted to information gathered from traditional sources like travel related bookings, electronic transactions and phone call / data browsing records. Information from unstructured data like pictures or videos uploaded / liked on social media, network of connections / followers on social media, responses to chat / message threads online, music / reading / media content interests and political / religious affiliations are also vital inputs. It goes even beyond into insights gleaned from information on TV channel switching and online click through patterns as well. Similarly, advertising and content testing has moved beyond fully manual viewing and Q&As based research to automated facial and eye-movement recognition technology based emotional analysis (*refer: Image 1*) and attention mapping. A go/no-go decision is completely dependent on customer response to pilot content.

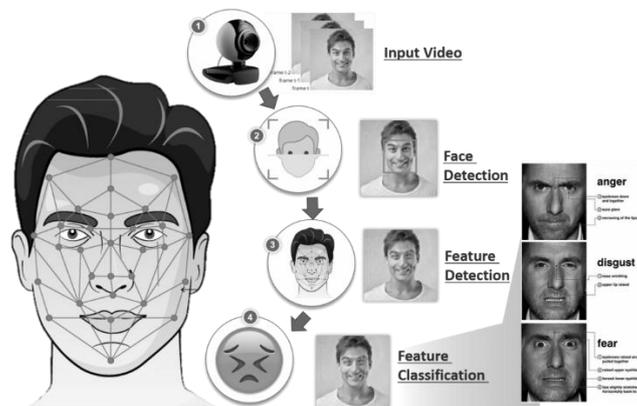


Image 1: Facial and eye-movement recognition technology based emotional analysis

Organizations are increasingly looking for talent that is in sync with these analytics trends to gain competitive advantage. Managers have to be able to understand capabilities of these tools in terms of customer data gathering and analysis. Business managers have to own the responsibility of identifying market, competitive and user data opportunities which are then captured and processed by the technical teams. **Organizations have to stay constantly alert and consistently agile** – alert to shifting customer behaviour driven by technology adoption to predicting the impact and agile in terms of response by leveraging insights from data analysis.

Mr. Amitkumar Yadav says that both business and technology teams are looking for people who can “peek into the future”. This requires the mind of a technologist and the vision of a business strategist. Often it is not possible to find them both in the same person – and therefore the need for cohesive teams with a healthy appetite for exploration backed by mutual respect.

Mr. Shantanu Saha, a seasoned HR consultant says that organizations are not necessarily looking for talent with specific technical skills sets. What they focus on is “varied interests and steep learning curve, apart from a willingness to change and give up on old ways of working”. He says that a basic level of awareness is taken for granted and organizations invest in training employees to increase technology adoption.

Ability to understand the value of technology in the context of markets, customers and trends is critical.

2.2.10 Cross-Functional Technology Impact Evaluation

Technology needs to be baked into the organizational ecosystem right at the strategy and planning stage by the operational teams, supported by the technical and finance teams. Therefore, every team has to be in harmony with each other in terms of appreciation of technology requirements, operational impact and financial commitment.

One of the biggest impact areas can be frontline operations execution. Executives’ productivity can be significantly enhanced by technologically enabling them with insights, real-time operations monitoring and process automation. Since systems are set up, affect at organizational levels, higher the level of adoption across functions, higher the aggregated impact at an overall level. Any technology that is siloed to a particular function or process is increasingly becoming sub-optimal in the hyperlinked workspace today. This necessitates focus on two aspects:

- Impact analysis of technology on organizational performance
- Adoption of technology driven applications/devices by intended stakeholders

Impact analysis of technology on organizational performance

Larger the organization, more the interdependence and interconnectedness of processes and therefore greater the impact of technological innovation. Enhancement of any link in the chain will have a cascading effect up and down the line. Once the needs are identified, it needs to be expanded upon and evaluated by a cross-functional team consisting of operations, technology, finance, sales & marketing and legal/compliance. According to Mr. Amit Kumar Yadav the finance teams play a critical support role to business and technology teams in evaluating impact and feasibility of any new technology, which goes beyond the responsibilities of finance in the traditional product management process. According to him, even as a finance professional, he has to regularly participate in cross functional deep-dives into tech-heavy proposals to “how the various components/requirements impacts business performance and also financial performance”. In these cases, the objective is to maintain business continuity and betterment of performance levels, thereby making detailed process analysis essential. As a professional, he feels that decisions on business needs vs. financial feasibility require a wide, futuristic business perspective – and not just narrow functional expertise.

To fit into this kind of a professional culture, awareness and appreciation – and not necessarily deep knowledge – of technology is essential. For example, for a professional in the media industry, a keen understanding of how different segments of customers are adopting technology to create different content consumption use cases is a must, irrespective of the department or function that he/she is in. OTT platform services on mobile devices has taken long format video content viewing out of the scope of home based appointment viewing to Out-of-Home / travel based on-demand viewing. This throws up challenges and opportunities in equal measure, which can only be addressed by a team of functionally diverse and technologically savvy industry professionals.

Adoption of technology driven applications/devices by intended stakeholders

Efficacy of any new application or technology is dependent on adoption by the stakeholder community. Therefore, understanding of ground level nuances to make the technology relevant and easy to use for the stakeholder is very important. This responsibility of making technology easy to adopt is as much with the business team as it is with the technical teams. To be able to execute this effectively, business and operations managers need to have a thorough understanding of available technology, which enables them to marry user requirements with technological capabilities to create value for users. Mr. Arjun Talwar makes a very important point when he says, “... the middle management needs to work on technology management for innovation and towards proving the business processes.” Driving adoption requires innovation in design and process management. While business managers and students are trained extensively on theories and methodologies of innovation in product management, not enough emphasis is given to mapping and evaluation of technology from a process innovation perspective.

3.0 Data & Technology Driven Business Models

In the digitally driven marketplace, customers often do not pay for services in money – the new currency of payment is data. Technology savvy marketers are increasingly positioning their services as “free” while gathering enormous amounts of data from the users of these services. The entire social media revolution is running on this tech-driven model.

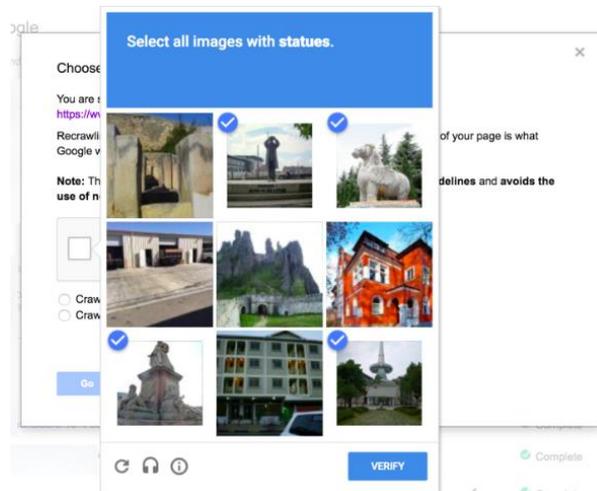


Image 2: Image based CAPTCHA

In fact, customers can be made unwitting contributors to research and development. An example is Google using customer inputs from CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) to train its AI Image Recognition. The CAPTCHA test is used as a security measure by websites and applications to avoid misuse by bots. What started as a set of difficult to recognize letters and numbers has now moved to images. Users are asked to validate a condition with respect to a set of images (*refer Image 2*). This information is used by Google as an input to its image recognition AI wherein human inputs are used to verify description of images by computers. Instead of paying checkers for this job, Google gets data from different websites using **CAPTCHA** where users give inputs free of cost. This is a classic example of matching customer requirements with business processes and technology to create value.

Advertising driven business models have been in existence in media for a very long time and has grown exponentially in the digital ecosystem. However, now the information gathered is being used for more than targeted advertising. Disparate businesses are collaborating for data exchange and trade to build complex customer behavior models which can be used for business forecasting, customer engagement programs, product / content development, media planning & advertising, business process optimization, security applications, audit & compliance, trading & transactions, research and CSR (Corporate Social Responsibility) initiatives.

Technology savvy organizations have built successful business models around data in new as well as old economy sectors. Specialized big data analytics firms like Fractal Analytics have developed powerful data capture and insights generation tools which can be applied across industries ranging from transportation to retail. These kinds of organizations are able to funnel very large amounts of disparate data into objective driven, actionable output.

On the other hand, a completely brick and mortar, restaurant chain like Barbeque Nation is increasingly differentiating themselves basis continuous data gathering from customers. They identified that customers look for something new to try out every time they visit, but at the same time have a few favourites which they look forward to. Therefore, the company has to be very careful in their decision to drop / add new dishes to their menu. To solve this issue, they are now gathering reactions of customers to specific dishes from across 100+ outlets across India which are being analyzed to refresh the menu on a regular basis. This has a direct impact on supply chain, manpower and logistics.

Predominantly old economy companies like those in the Out-Of-Home media business are also evolving to deeply focus on customer behaviour. Measuring efficacy of billboards has always been a grey area with very little / inaccurate data availability. The scenario is changing dramatically with electronic surveillance and social media platforms gaining momentum. Video feeds from traffic monitoring cameras are being analyzed with image recognition technology to measure efficacy of individual display properties. Added to this are data from online services like Google Maps which provide traffic data and geo-tagging of locations, geo-tagging of user locations / pics uploaded on social media and related user profile data. A combination of these data inputs helps media agencies customize OOH media plans to individual target markets of brands. As a result, they are able to offer services with deep consumer insights at par with electronic media, which was not possible earlier.

In all of the above cases, ***innovation and value are driven by a combination of deep understanding of business and technological expertise***. Mr. Amitkumar Yadav articulates the impact of appreciation of technology very succinctly when he says, “ability to understand relevant technology is a ‘Good to have skill’ and not necessarily ‘Must have’. However, when individuals come into such kind of roles like mine, those who have a knack to acquire the understanding quickly are in a better position to ask the most relevant question and more importantly make an indelible mark to bring a positive change for the organisation.”

4.0 Technology Skill Sets for the Modern Manager

The modern manager needs to come prepared with a technology appreciation tool kit.

4.1 Environmental Awareness

Business managers need to constantly track technological applications in their ecosystem. The increasing collaboration of business and academia throws up additional opportunities, which can be developed for substantial benefits. The mantra of *Read-Watch-Experience* has to become a part of life spanning the professional and personal.

Trend tracking must be done with the help of social media and other online resources, which have become platforms for organizations to showcase their success stories, for developers to talk about their ideas and for users to express their experiences. Managers in fact have a choice of write-ups, presentations and videos, depending on their preferred mode of learning.

Experiential awareness also needs to be enhanced to appreciate underlying technological capabilities. Every physical/digital experience needs to be appreciated critically as consumers as well as business managers to identify opportunities. Special focus needs to be paid to interfaces, which are critical to user adoption and sustenance.

4.2 Use Case Exploration

Having built up environmental awareness, a disposition to explore possible use cases needs to be developed. It's important to be able to first ask and then find answers to the question – *can this technology be applied effectively to enhance the value of my product/service for my customers?* In many cases, those who are completely unrelated to the business suggest the most innovative options but are keen observers. Tools like customer journey mapping and gaming workshops can be systematically applied. Use cases need to be developed and explored creatively even before feasibility evaluation.

Managers with non-technical backgrounds often give up at this stage due to various reasons like technophobia, siloed work environments, resistance to change or lack of focus. To overcome these challenges, a healthy relationship with organizational tech teams can come in handy. It is important to engage in frequent conversations around possible opportunities. The ability to ask the right questions and listen constructively often become more important than coming up with a list of options in these interactions.

4.3 Customers' Technology Adoption Profiling

Mapping of technology adoption has to become an essential part of customer profiling – especially in mass-market products. Adoption of tech-products are usually very habit forming and therefore, if integrated with a service/ product offering, can help build loyalty and extend customer life cycles.

What technology related products are customers using and why? The best of ideas can prove to be ineffective if this question is not answered in detail. Adoption of technology is a function of various factors like social situations, cultural influences, income levels, demographics, infrastructure, use case availability and personal preferences. For example, growth of internet usage in India is heavily influenced by regional language content and daily commute times, in addition to service availability and device prices.

This mapping exercise is also helpful in forming brand / strategic alliances with complementary categories. Opportunities of cross promotions and use case enhancements can be leveraged as differentiators. There are lots of examples in the travel industry wherein platforms offering travel bookings actively cross promote with digital payment services and telecom services to offer integrated packages.

4.4 Analytics & Insights Orientation

Digitalization is blurring the boundaries between different industry segments. An example being online travel service providers like Ola and telecom service providers like Airtel providing their own digital wallets to facilitate payment. As the 'hire-economy' gains over the 'own-economy', the demand for integrated services will increase further.

In this scenario, ***ability to identify areas of expansion through data driven insights is very important***. This can significantly reduce time-to-market and upgradation cycles. The ability to correlate disparate data sets to analyze influence on customer behaviour and impact on processes can help in differentiated product development. Once the customer is acquired, tracking analyzing behavioural data is required to maximize customer life cycles.

4.5 Technology-Process Mapping

Collaboration is key to successful implementation of any agile business model. At the same time, customers are focusing more on experience and customization rather than ownership and homogenization. Therefore, ***application of technology-process mapping has to move beyond automation into collaboration and experience enhancement***.

Industries across segments are looking to maximize employee productivity through collaborative workplaces where the manpower is the focus. Mapping to business requirements to skill sets, constant upgradation of employee capabilities and reaping benefits of intrapreneurial initiatives are helping in this evolution. All these aspects need to be streamlined and synchronized through technologically enabled processes which encourage flexibility and innovation. This also results in greater transparency and accountability.

The multifold increase in brand interaction opportunities has led to overcrowding to the extent that traditional forms of advertising are being viewed as unfriendly intrusions. This is leading brands to craft immersive experiences to make moments of truth memorable rather than just creative communication. Delivery of these experiences need to be through intuitive interfaces which involve rather than intrude.

4.6 Evolution Orientation

Technology and product life cycles are shrinking at a furious pace, thereby limiting the time available for break-even and profit booking. In this scenario, technology development today has to follow the agile and fail fast model wherein they need to evolve frequently and those that are ineffective need to be identified and discarded quickly.

Business managers also need to adopt the agile and fail fast approach for product development and customer life cycle management to account for shrinking customer attention spans. For this, adoption of relevant technologies throughout the value generation chain is necessary. Identification of the most impactful, cost-effective and relevant platforms has to be an ongoing process to maintain customer relevance and market share.

5.0 Conclusion

Technology Management is an essential skill set for professional managers irrespective of their academic training or functional vertical in today's technology driven business ecosystem. Corporates have realized that connecting with stakeholders and customers in ways that they are comfortable is essential to build empathy and engagement. Organizations therefore expect aspirants and professionals to have awareness of technology in the larger business and social ecosystem to be able to leverage them for improving KPIs.

The role of technology in business today spans product differentiation, productivity improvement, customer experience improvement, cost optimization, monitoring & control, and overall decision support. This has given rise to "technology generalists" who specialize in tracking technology trends and applying them to customer use cases and organizational processes rather than being a technology specialist. Business models in traditional sectors are also incorporating technologically enhanced, cross functional processes to increase efficiencies.

Technology Management skills for the modern manager must include updated environmental awareness, ability to leverage technology tools to different use cases, understanding of technology adoption lifecycles (customer and business) and the ability to adopt this analysis to operational processes through timely interventions. A lot of these skills need to be practiced to gain expertise in, and therefore students need early exposure to them to be able to build the same into their skill development roadmap.

The field of Technology Management for general management can vary very significantly between industry segments, functional verticals and target customer profiles. Requisite awareness of technology trends can change basis business processes and product / service adoption lifecycles. Therefore, sector specific knowledge base – retail / FMCG / telecom / education / hospitality etc - of technology management needs to be developed and structured to enable better preparation depending on career path choice of aspirants.

At the same time, best practices in Technology Management in diverse specialized areas like marketing, product management, financial planning, customer experience delivery, manpower evaluation and supply chain management also need to be identified, recorded and incorporated into training.

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5G and its impact on Supply Chain

A. Nagendra¹

Abstract

5G stands for fifth generation and the next in line in the future generation of wireless networks. The aggregate effect of 5G technology will allow wireless networks with far greater capability to support bandwidth-intensive content, large-scale sensor arrays, and low-latency remote control applications. 5G will enable machine-to-machine communications over wireless networks on a far larger scale than any previous technology. It is a crucial aspect of a 5G-powered (Internet of Things, henceforth, IoT), wherein vast numbers of human-made objects are interconnected via sophisticated wireless networks. It will allow significant improvements in areas like real-time monitoring of supply chains. This technology also dramatically expands businesses' capabilities, sourcing, procurement strategies, and support their growing needs. The speed of 5G will make it easier to select suppliers, communicate with and work with them, which will result in cost savings and improved overall efficiency. This will revolutionise the technology that is currently used to track the location of products within the supply chain such as QR Code scanning or RFID. With the complexity of supply chains and the number of stakeholders involved, it is essential to be able to identify in real time two important aspects : (i) where the product is located within the supply chain and (ii) who is responsible for it. 5G can be used to achieve real-time tracking and traceability of products. This technology provides wireless networks with far greater capability. By installing 5G-enabled IoT sensors on each product, either on the inside or outside of the packaging, stakeholders in the supply chain can track its location easily and transparently. These sensors also report moisture, temperature, pressure and other parameters providing feedback in real time about the status and condition of the products.

Key Words: *5G, IoT, supply chain, RFID, QR Code, sensors, sourcing, procurement.*

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1.0 Introduction

Each new generation of wireless networks conveys quicker speeds and greater usefulness to our smartphones. 1G paved the way for the first cell phone; 2G enabled text for the first time; 3G enabled up gradation from text to online, and 4G delivered the speeds that customers savour today. But as users are ever-increasing, 4G has reached the limit of what it is capable of at the time when users want even more data for their smartphones and devices. Now, technology has headed towards 5G, the next generation of wireless, which is capable of handling thousand times more traffic than existing networks and it will be 10x faster than 4G LTE. One can imagine downloading an HD movie within seconds using the 5G network, which is deemed to be the future for virtual reality, autonomous driving and the Internet of Things (IoT). 5G allows multiple integrated wireless/access solutions enabling a long-term networked society.

1.1 Technologies of 5G

Five technologies are emerging as a base for 5G networks which includes: millimetre waves, small cell, massive MIMO, beamforming and full duplex.

Smartphones and other electronic devices operate in a narrow bandwidth of frequencies less than 6 GHz in the radio frequency spectrum. But these frequencies can only get crowded as carriers can squeeze limited bits of data. So, 5G enables to enhancing the bandwidth by opening to shorter millimetre waves preferably falling between 30 and 300 GHz to avoid slower service and drop connections. Wireless networks depend on large, high-powered cell towers to broadcast signals over long distances, but higher frequency waves have a harder time travelling through obstacles.

Small cell networks would solve this problem using thousands of low-power mini base stations, which are closer together than traditional towers forming a relay team to transmit signals around obstructions. It can be used in cities where users, when moving behind an obstruction, the user's smartphone would automatically switch to a new base station in better of the device, thus allowing the user to be connected.

The existing 4G base stations have about a dozen ports for antennas that handle all cellular traffic, but massive MIMO (Multiple Input Multiple Output) base stations can support about a hundred ports. It could increase the capacity of existing networks.

Beamforming is a traffic signaling system for cellular signals instead of broadcasting in all directions; it would allow a base station to send a focused stream of data to a specific user. Its precision prevents interference and improves efficiency, thus implying stations could handle more incoming and outgoing data streams at once. Researchers have used silicon transistors to create high-speed switches that stop the backward role of radio waves. This can ultimately avoid the process of transmitting signals to and fro, thereby decreasing the chances of interference for the waves. Hence, full duplex feature reroutes the waves in such a way so that they can get past each other without causing any interference.

1.2. The Next Generation – Changing Lives

The latest generation of mobile communication was all about higher bit-rate in dealing with massive mobile broadband. 5G as technology will not only focus on high-bit rate but also, it will have goals towards low bit-rate devices and sensors enabling IoT applications. 5G will be the backbone of many new types of services starting from broadband connectivity to huge public areas to remote automation to critical machines in dangerous work environments. Long Term Evolution (4G) helped to achieve heights when it comes to mobile broadband. However, with the ever-increasing demand for mobile data, 5G will provide even better data rate and will have better system capacity. A lot of focus is to offer a free driving experience. Companies like Google, Apple, Volvo and Uber are working a lot to develop connected cars and other smart vehicles. 5G will be able to provide the network part of this new technology. Even in the case of media which is the sole reason for the massive increase in mobile broadband demand from the last couple of years, 5G will provide On-demand video streaming, Live TV, and gaming.

The future of technology is primarily automation of everything. One of the use cases for 5G is to provide better connectivity to heavy machinery, smart-grids and remote surgeries. The beneficiaries in this process would be manufacturing, mining and healthcare industries. Though IoT is all about connecting things, humans play a significant role in it. The new areas where 5G will make a difference are gaming, augmented reality (AR), tracking, surveillance, smart-homes, and smart-postage.

5G integrated networks can revolutionise our daily needs. The connected home platform Samsung launched in refrigeration called Family Hub is the prime example. Here, one can be able to control things like smart lights and thermostats right from the fridge and monitor the feed from compatible connected cameras like the Ring Video Doorbell. It also includes grocery-tracking fridge cameras using a feature called Meal Planner, and on enabling this, the refrigerator will recommend recipes based on family food's preferences, allergies and ingredients.

5G, when integrated with blockchain, will drastically redefine how mobile networks are built, what business models will create the most effective returns and how the value chain of the industry itself is constructed. For example, IBM on venturing with Maersk implements blockchain in shipping by creating a platform called Trade Lens. This contributes to a 40% reduction in shipment of packaging materials to the production line in the U.S and also makes information gathering for shipments reduced from 10-step to a single-step process. Further, such technology helps in fraud detection, secured digitisation, tremendous savings and enhancement of global supply chain security.

1.3. 5G Network Communication for Supply Chains

1.3.1. Significantly faster data speeds

Currently, 4G networks can achieve peak download speeds of one gigabit per second, though in practice it's never happening. With 5G, this would increase to 10Gbps.

1.3.2. Autonomous (autopilot) Cars

Because of the sensors on the Autonomous vehicle, they will have the capacity to pack closer together, permitting more cars on the road and thereby reducing traffic times the lack of human error while driving, will result in a much safer journey.

1.3.3. IoT – a more "connected world"

The Internet of Things (wearables, smart home appliances, and connected cars) is expected to grow exponentially in the coming years, and it will need a network that can accommodate billions of connected devices. The partial goals of 5G are to provide that immense capacity, as well as to be able to assign bandwidth depending on the needs of both the application and user.

3.4. Virtual Reality

As far as the benefits of virtual reality are concerned, there are a lot of possibilities. Users around the world are trying to find out the advantages of virtual reality in education, virtual reality in medical school, virtual reality medicines, virtual reality education software and much more.

2.0 5G & Supply Chain

2.1 5G – Impact on Procurement

The introduction of 5G would significantly expand businesses' capabilities, activities, procurement and sourcing strategies, and support their continuously growing needs. 5G speed will make them easier to communicate with and work with suppliers, resulting in cost optimisation and improved overall efficiency. Speed is not the only advantage of 5G. Lower latencies will mean fewer internet dropouts, while it is also expected to be widely available and power-efficient than 4G. These factors will allow procurement at a higher speed opening new opportunities for value, which will, in turn, deliver savings.

2.2 5G – Impact on Production Communication Network

Another area where 5G promises excellent innovation is the use in production communication networks. This network is basically inside a factory that allows electronic devices to communicate. It is used, to coordinate the operation of machines, read their statistics and log files, re-program them, and install software updates. To achieve this, the network needs to be reliable and have low latency.

The recent also used wired networks to accomplish this. While wired make the system secure, they also make it inflexible. In the recent past, factories have been designed and built with static configurations in mind: Changing a production process was costly and time-consuming. However, future factories are expected to be highly flexible and even customise individual products. To accomplish this, the machines of the factory must be re-programmed or also shifted to create a new physical layout more often than before. When many devices must be re-programmed with individual software updates, the total amount of data can be significant even though each update is small. 5G can reduce the time that is needed to reconfigure the factory and therefore reduce downtime for a factory to produce new goods faster.

If the machines of the production line should be moved (either physically or consequently), it is preferred when the correspondence of the machines is remotely contrasted with wired; it decreases the work essential to run machines and along these lines again lessens downtime of the processing plant. As an extra increment in speed, the machines can even be reconfigured, while they are being moved. Another favourable position of utilizing remote systems is the capacity to trade data with gadgets which can't be associated by wires — for example, sensors on rotating axes or inside sealed containers. Having such additional sensor data allows to closely monitor and controls the production process. In brief, using a wireless communication network in a factory improves the flexibility in use cases which are already possible and makes new use cases possible. While the advantages could also be achieved by a custom-designed wireless factory network, the use of standardised 5G components provides more benefits. It is due to the expected number of produced 5G elements they will be cheap (economy of scale), and features which would be too complicated to develop for a single-purpose network will be implemented and usable in 5G. These are general advantages not only for production networks, but also for energy, automotive, and health networks. If 5G becomes a network architecture that can support all these sectors, they can all benefit from the shared development cost.

To make all these advantages applicable, it is necessary that 5G will be able to fulfil the requirements of as many sectors as possible. The most challenging element for production networks is high reliability, but other areas have different aspects. In this initial phase of 5G development, it is essential that the requirements are considered in the core 5G design. It is now necessary that the production line vendors (energy providers, health sector, and automotive industry) and telecommunication operators start to cooperate to ensure that 5G brings possible benefits to all of them.

2.3 5G – Impact on Manufacturing

A manufacturing process is a sequence of operations and procedures designed to create a specific product. In an era of intense volatility due to shorter product and business cycles, manufacturing companies around the globe are under extreme pressure. 5G networks offer telecom operators and manufacturers the chance to build smart factories and indeed take advantage of technologies such as artificial intelligence, automation, augmented reality for troubleshooting, and the Internet of Things (IoT).

2.3.1 The path to manufacturing:

High reliability and low latency are needed to support critical applications. High connection density and bandwidth secure ubiquitous connectivity. The 5G technology will allow for higher flexibility, lower cost, and shorter lead times for factory floor production reconfiguration, layout changes, and alterations. 5G enables operators to address industrial control and automation systems, planning and design systems, and field devices. 5G also allows factories to replace manual tracking of tool usage data with an automated solution which is the cutting of the amount of manual work by 50 per cent.

5G can also make a significant impact on manufacturers regarding process automation and robotics. It plays a vital role in connecting production line robotics by providing high-performance mobile services such as:

- Connectivity for robotics, removing the need for fibre tethering
- Quick reactions to discrepancies, helping to avoid damaging expensive components
- Live remote monitoring of video streams from robotics
- Low latency-enabled remote-control applications

5G enabled Augmented Reality can support the simulation of factory process and provide training to workers. It allows workers to quickly learn how maintenance, construction, and repair of equipment in the factory should be carried out.

2.3.2 Data Collection and analysis in real time:

The 5G Enabled Manufacturing (5GEM) project by Ericsson used 5G networks and technology to facilitate simultaneous product customisation and maximum production output – without sacrificing flexibility, traceability, sustainability, or safety. It was achieved by creating a network of connected machines that allow manufacturers to collect, analyse, and distribute data in real time. It allowed for enhancement in connectivity and kept workers continuously in the loop, enabling manufacturers to acquire and access much more significant amounts of data – at far higher speeds – more efficiently than before.

2.4 5G – Revolutionizing IoT and Block Chain

The 4G wireless mobile technology transformed the consumer marketplace, and 5G is set to renovate the entire business prospect. Industrial applications comprising of significant figures of sensors and actuators will be one of the innovative usages of 5G. It will deliver ultra-low latency essential for some portable or mobile apps and services such as industrial automation and virtual reality.

Smart factories will be using sensors for monitoring all facets of operational setups shortly. Connected devices will be used in factories which will enable manufacturers to collect the data and use the information to understand and change their usage for best outputs. 5G network is going to have a high capacity and equipped with wireless flexibility.

2.4.1 5G in factory regulation:

5G will support the provision of factory tools for manufacturing process optimisation both remote and local. 5G will be efficient in spectrum management, providing low latency communication, and facilitating the controlling structures at the edge of the network. 5G can supervise the development of the entire manufacturing process, which will be more efficient and quicker than before.

2.4.2 5G in energy monitoring:

Incorporation of smart meters requires a lot of technologies. 5G can permit private networks and spectrum. 5G will eventually result in making the integration of smart meters much more accessible and cost-effective, making it the ideal and integrated connectivity platform.

2.4.3 5G in Industrial IoT:

5G enabled Industry 4.0 are going to prove the most significant advancement for the future of industrial production systems. IoT is presumed to play a significant role in conjunction with other technologies like Cyber-Physical Systems where the parameters such as actuators, sensors, tags, and readers will be composed and uploaded to a cloud platform. The data collected will be analysed in actual-time and help in predicting the status of the equipment.

5G is expected to be the most supportive and suitable for industrial automation like interoperability, connectivity, real-time process controller and virtualisation need high-speed networks, reliable communication, low power consumption and secure systems. Blockchain technology is particularly well-suited to respond to both the opportunities and challenges of a 5G-enabled IoT. With a secure 5G enabled IoT network, supply chains can leverage the integrity of a blockchain's logs or ledger, when, which properly implemented, are nearly impossible to change. Without this integrity, the valuable data collected about goods in transit or the vehicles transporting them would be the subject of much more scepticism about their accuracy.

With a secure 5G enabled IoT network, supply chains can leverage the integrity of a blockchain's logs or ledger, when properly implemented, are nearly impossible to alter. Without this integrity, the valuable data collected about goods in transit or the vehicles transporting them would be the subject of much more scepticism about their accuracy.

Blockchain technology, coupled with the power of 5G, will serve not only to save companies billions of dollars in operating costs but also in legal fees arising from disputes that could have been avoided when smart contracts are used. For example, a smart contract prototype can streamline the supply-chain processes and allow for the automatic payment of goods upon receipt and erase the need of having to deal with accounts receivables, waiting 30 days for payment of goods received, and paying for billing department personnel to track down distributors with outstanding invoices.

With the use of blockchain technology integrated with the power of 5G, a shipment can be tracked so that both the distributor and the manufacturer instantly know where exactly they stand concerning a volume incentive rebate.

For example, a tracking device on a shipment of 10,000 units of a phone model would allow data to be uploaded immediately onto the blockchain and shows that the shipment was received in the distributor's warehouse, which would trigger instant automatic payment by the distributor to the manufacturer.

2.5 5G – Impact on Logistics

Logistics means having the right product, at the right place, at the right time. It is the backbone on which supply chains are driven. Road, rail, and sea logistics will all be transformed by 5G. The use of 5G and IoT would deliver live information to systems that could follow most items from factory to customer. Recent developments, such as just-in-time deliveries, could become mainstream as 5G and IoT devices make tracking deliveries possible in real time. The devices would boost efficiency between warehouses and distributors, giving customers clearer visibility of their deliveries. With 5G and IoT, all the vehicles, for deliveries, in the network would have the capability to talk to each other.

When added to the latest network architectures, 5G technology has the potential to provide increased control and visibility over transportation systems. Through mobile technology, 5G is expected to provide end-to-end connectivity across the cities and beyond. It will support many types of communications for transportation firms. Two of the most critical include:

Vehicle-to-vehicle (V2V): Vehicles relay signals directly to each other

Vehicle-to-infrastructure (V2I): Vehicles communicate with sensors on roads, bridges and traffic lights.

5G will deliver game-changing benefits to consumers, enabling them to access 100 times faster than possible today. With IoT paving the way for intelligent vehicles, smart infrastructure, and products, many in logistics believe that 5G networks, which will enable consumers to process data at over one gigabyte per second, also could be the enabler for unprecedented change in that they allow the "physical internet" to flourish. Through real-time cross-docking hubs, which 5G will support, this highly collaborative logistics model will consolidate loads and drastically reduce dead-end mileage. For 5G to be truly transformative, it will require "huge swaths of the high-band spectrum to support local hotspots."

2.5.1 Digitalizing port operations through 5G – The new age of discovery:

The goal is to obtain a connected port, where devices, machines and humans would be able to share real-time information. Through this, the port community will be able to work more smartly and safely. Also, sensors, cameras and devices at a port can connect to network infrastructure, creating an integrated communications system. Instead of contacting the distribution centre by phone and requesting them to move the container to a specific destination, a smart as well as integrated infrastructure allows the container to communicate with both the target destination as well as with all humans and machines along the supply chain. A recent proof of this concept can be seen at the Port of Livorno to demonstrate automated remote control of Unmanned Ground Vehicles (UGVs) for loading and unloading operations in the port area. The expectation is that the robots will cooperate by working in swarms, using the technology of cloud and distributed computing. Connected vehicles and UGVs together with a large set of scalar sensors will feature both M2M and remote controls.

A well connected and integrated port brings more vessels, more trade and an increase in sustainable development, which will open up to many new opportunities. Also, with the many different departments operating at seaports, including coastguards, customs, the police, the transport authorities and some of the other institutional bodies, being able to share data on common functions in this way promotes a safer, smarter and more efficient working environment.

3.0 Challenges faced by 5G in Supply Chain

As we move into the 5G era, the demands for mobile data continue to rise rapidly, and quicker connectivity speeds open ways to new-data heavy applications – such as Fixed Wireless Access (FWA), high-quality video (4K, 8K) and virtual reality (VR) – leaving the telecom industry facing brand new connectivity challenges. However, there is mounting pressure to keep people connected, where millions of businesses and consumers battle to get online with the help of the same limited spectrum – coupled with the improvements needed in technology and infrastructure, threatens how quickly we can realize the full potential of 5G.

The first consideration is the limitation of the spectrum, and it is the most expensive. Therefore, the industry will also need to make better use of the spectrum that mobile network operators (MNOs) already must deal with massive demand across busy cities and suburban areas.

The transition to 5G from latest networks will require more than just an increase in asset numbers – the industry needs to carefully look at how its infrastructure operates and how it will support the new technology to provide the reliable, superfast connectivity customers expect.

5G will bring seismic changes to the industry and providers will need to reassess how they sell, deliver and manage their services. Network Slicing will provide an opportunity to offer services with very different features via a standard set of infrastructures.

5G will require complete networking of the existing mobile networks, including the last mile problem of hard wiring the system of transmitters. Every cell tower transmitting a wireless signal is hard wired with fibre optic cable carrying all that data to it. This unseen network of cables is called ‘backhaul’, and it's what gives us the illusion that one is really free of a physical connection. This is one of the biggest challenges faced by 5G. Currently, mobiles use low frequencies to transmit data. The plans for 5G, however, move to the other end of the spectrum, to the higher frequencies previously reserved for satellites. This will have a clear advantage: higher frequencies carry more data. High frequency waves ‘vibrate’ faster than low frequency waves; each ‘vibration’ faster than low frequency waves; each ‘vibration’ is a chance to carry information. What the future needs simply can't happen on the current frequencies one uses for his/her mobile devices.

From suppliers to business partners through horizontal integration domain, consisting of inter-industry value chains and supply chains, starting from raw materials and ending with the finished products delivered to customers. Smart technology and servitization aspects can be implemented in any good such as locks, meters, lights, lifts, vehicles, and in any product, one can imagine. This has a crucial impact not only in how these products are designed, manufactured, sold and maintained, but also in who are the providers, with the appearance of new players and the disappearing of others, but in a closer relationship with the clients. The transformation to become a provider of an integrated product-service offering requires more cooperation between providers and the supporting network. From product efficiency to increased benefit, by vertical integration domain, this means the linkage of production processes performed by multiple systems inside the manufacturer boundaries. Whereas the purely physical product logic relies on optimal and efficient industrial processes, a product-service system requires the redesign of the manufacturing infrastructures and context to cope with the full integration of services in the production process. For instance, new personalised user demands could be matched appropriately with new services designed and provided after the physical product has not only been manufactured but also delivered to the customer. It requires a new approach such as 5G for the manufacturer infrastructure.

4.0 Future Scope of 5G in Supply Chain

2020 is regarded as the estimated arrival date of 5G, but the industry needs to know that this will be the very beginning of the new connectivity era, rather than the pinnacle. The technologies being trailed and implemented right now will help things off to a flying start. However, the future of 5G will be heavily dependent on the work that is accomplished over the coming years to prepare for and overcome the inevitable challenges and limitations of delivering superfast connectivity and high network demands. If network operators, infrastructure providers, local authorities and the Government work in close quarters to develop the infrastructure, the chances of India becoming a true leader of the 5G era are highly likely.

4.1 The 5G for Future

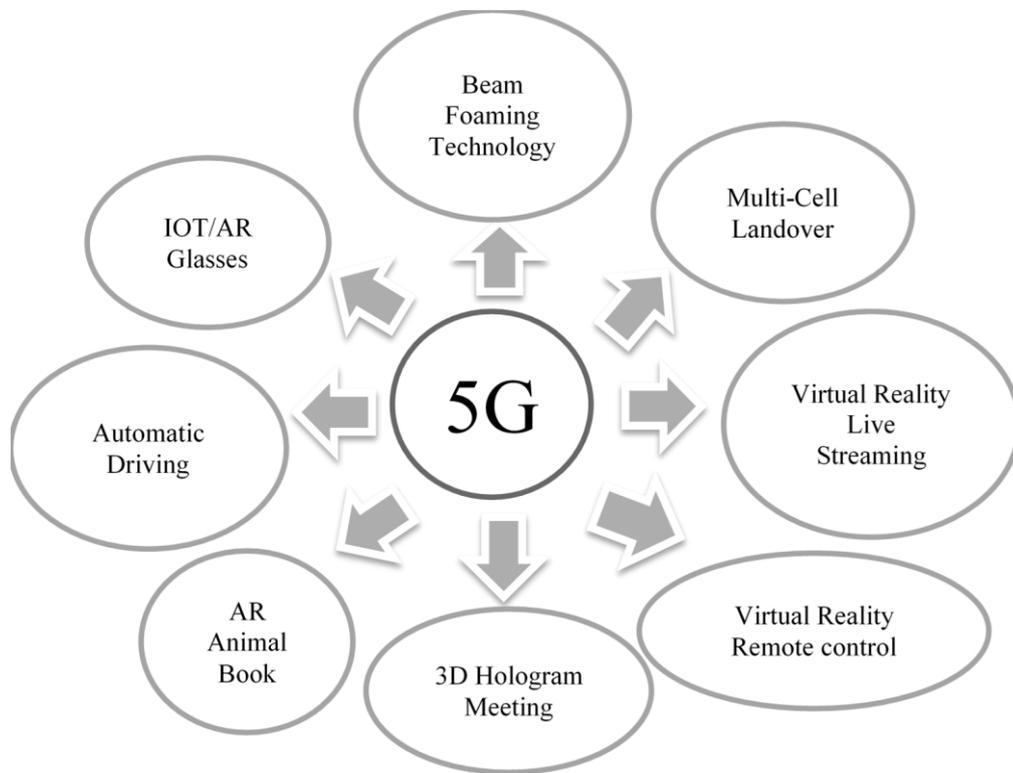


Image 1: Future of 5G

The global 5G technology market is expected to witness significant growth from 2016 to 2024. Rising worldwide adoption of internet-enabled devices will drive the industry. Mobile service providers believe that 5G services will be rolled out by 2020 to meet customer and business demands. Surging demand for extensive network coverage and high-speed internet from various industry applications will propel market growth.

These include autonomous driving, distant learning, video conferencing & multi-user gaming, telemedicine and opera live streaming. The global industry is categorized based on technologies, applications, and regions. The technology segment comprises Radio Access Technologies (RAT), Wi-Fi, High-Speed Package Access (HSPA), Global System for Mobile (GSM), and Worldwide Interoperability for Microwave Access (WiMAX). Applications include healthcare, government & utilities, retail, individual users, offices, and defence & military. Owing to high investments in research & development, government & utilities lead the application segment.

Geographically, the global 5G technology market is divided into Europe, North America, Asia Pacific, and Rest of the World. The U.S. market is estimated to grow robustly during the forecast period. This is because of increasing subscriptions in the region. The Asia-Pacific market too will register significant growth. Various countries such as China, Korea, and India will invest huge sums to support ongoing developments and initiatives in 5G technology. The Indian government has spent USD 5.5. million over the last couple of years on 5G technology. This investment was primarily directed towards advanced research and development. The cash-strapped Indian telecom operators like Bharti Airtel and Vodafone Idea are trying hard to push the 5G spectrum action to 2020, while the Mukesh Ambani led telco is vying hard to participate in the 5G auctions as early as possible.

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Impact of Demonetization on Volatility of Stock Prices of Companies in BSE-SENSEX

Dr. Arvind A. Dhond¹

Abstract

This paper investigates the basic impact of demonetization of cash on the volatility of SENSEX. Making use of event study methodology; one of the popular methodologies used to measure the impact of an event. We assess the impact of the announcement of the demonetization event on the stock market. In the present study in order to measure the effect of demonetization and its influence on stock prices, a period of 500 days was chosen, 250 days prior to the happening of the event and 250 days post announcement of demonetization. The initial investment suggested that sectors, which benefitted from the event, were Port, Auto-Ancillary, Telecom, Bank, FMCG, Housing Finance, Power, Steel and Infrastructure.

Key Words: *Demonetization, Volatility, SENSEX, event study*

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1.0 Introduction

The most recent demonetization announced in India on 8th November, 2016 declaring that use of all Rs. 500 and Rs. 1,000 banknotes of the Mahatma Gandhi Series would be invalid past midnight of 8th November, 2016 has left a long lasting impact on several fronts including on the stock markets. Pertaining to the nascent understanding of demonetization as an event there was not much literature associated with it with the Asian nations. Notable exceptions were (Sunil & Shinoy, 2017) wherein they defined Demonetization is an act of seizing a currency unit of its status as legal tender. Demonetization is necessary whenever there is a need to change national currency (Vedashree Mali, 2016). The highest demonetization note printed by the Reserve Bank of India, Rs 10,000 note was demonetized in January 1946 and again in January 1978. On 8 November 2016, the Government of India announced the demonetization of all ₹500 and ₹1,000 banknotes. Around 97% of the demonetized amount has been deposited into banks i.e. Rs14.97 trillion (\$220 billion) out of Rs15.4 trillion as on Dec 30, 2016. The government claimed that the action would “curtail the shadow economy and crack down on the use of illicit and counterfeit cash to fund illegal activity and terrorism”. Therefore, the sudden nature of the announcement and the prolonged cash shortages in the weeks that followed created significant disruption throughout the economy, threatening economic output (Kanchan, 2016). A resultant impact on the stock market was also well expected. Demonetization leads to a situation where the country would suddenly feel short of the money that it needed to enable the transactions. This leads to a decrease in the prices of goods and services. All these issues were raised in Rajanish kumar (2017) in analysing the effect of demonetisation on the stock exchange. However, we make use of this arguments to empirically examining the impact sector-wise as suggested by Prasanna Chandra (2012).

Taking advantage of this quasi-natural experiment, we use the event methodology similar to measure the impact of the event on Indian stock market (for instance, refer Iyengar, Iyengar and Sampat May (2017)).

1.1 Objectives and Hypothesis Formulation

- To evaluate the volatility of stock prices of the selected company in BSE-SENSEX due to the announcement of demonetization.
- To analyse the reasons for the volatility.

1.1.2 Hypothesis

- *Null Hypothesis*: Announcement of Demonetization does not significantly influence the market price of the share.
- *Alternative Hypothesis*: Announcement of Demonetization significantly influences the market price of the share.

1.1.3 Scope of the Study

The research study was conducted to identify the problems faced by the government because of the circulation of high denomination notes beyond the required limit. The study revealed that nearly 86% of the total Indian currency, which was in circulation, was high denomination notes of Rs. 500 and Rs. 1,000. And more over most of the fake currency in circulation was also in high denomination currency notes of Rs. 500 and Rs.1,000. This study focuses on the impact of demonetization on the volatility of stock prices of selected companies in BSE-SENSEX. 31 companies are considered for this study for which the data is collected from Bombay Stock Exchange (BSE). The closing prices of stocks for 500 days (250 days before demonetization and 250 days after demonetization) were used in order to determine the trend.

1.1.4 Sample Size and Data Source

The 30 companies, which play an important role in calculating BSE-SENSEX is selected in the present study. The period of study is 500 days (including non-trading days), 250 days before demonetization and 250 days after demonetization. Secondary data from BSE-SENSEX for the 500 days is chosen for analysis of price trend. The analysis of numerical values reported in the below mentioned tables is from the researcher's own calculations computed by using the numerical values of raw data relating to stock prices obtained from the published Financial Reports.

1.1.5 Data Analysis and Interpretation

Based on the analysis in Figure-1 it can be inferred that demonetization has positive impact on the stock price of Adani Ports and Special Economic Zone Ltd.

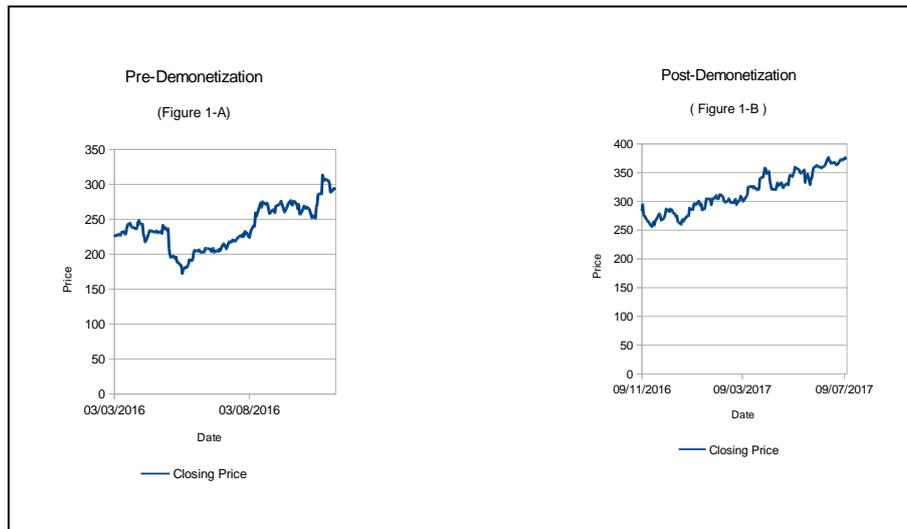


Figure 1: Adani Ports and Special Economic Zone Ltd.

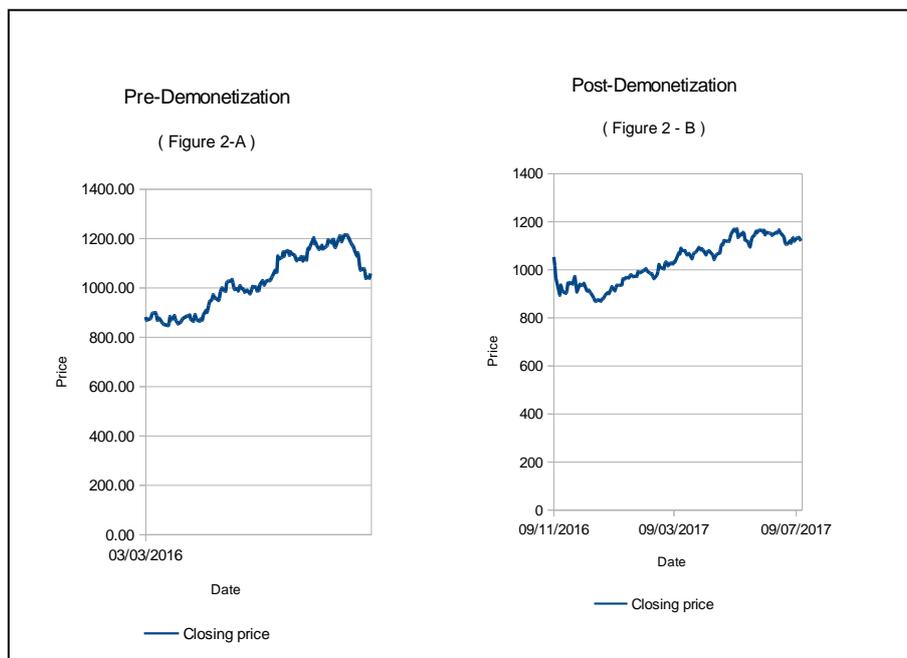


Figure 2: Asian Paints Ltd.

Based on the analysis in Figure-2 it can be inferred that demonetization has no impact on the stock price of Asian Paints Ltd.

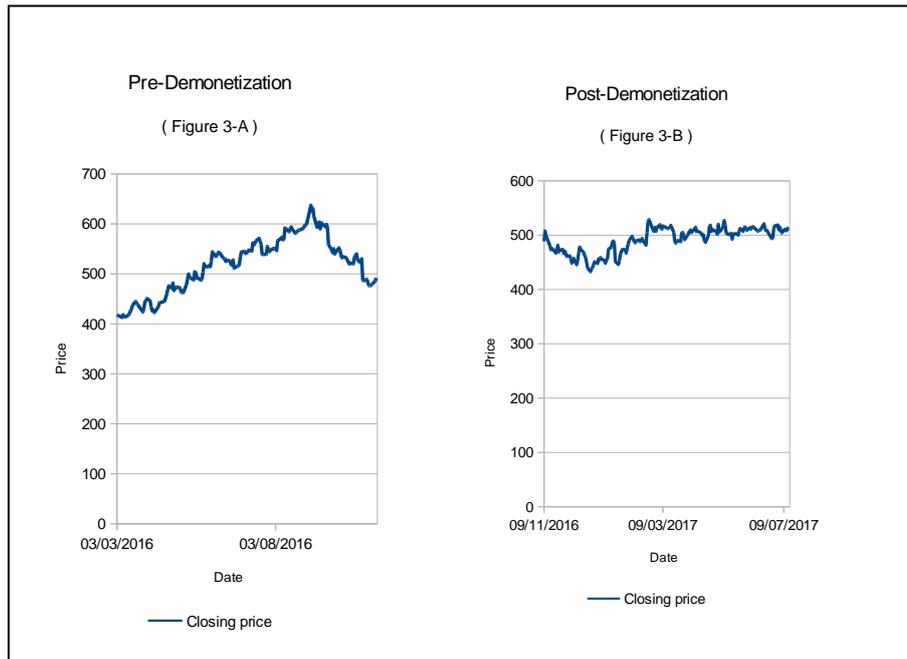


Figure 3: Axis Bank Ltd.

Based on the analysis in Figure-3 it can be inferred that demonetization has no impact on the stock price of Axis Bank Ltd.

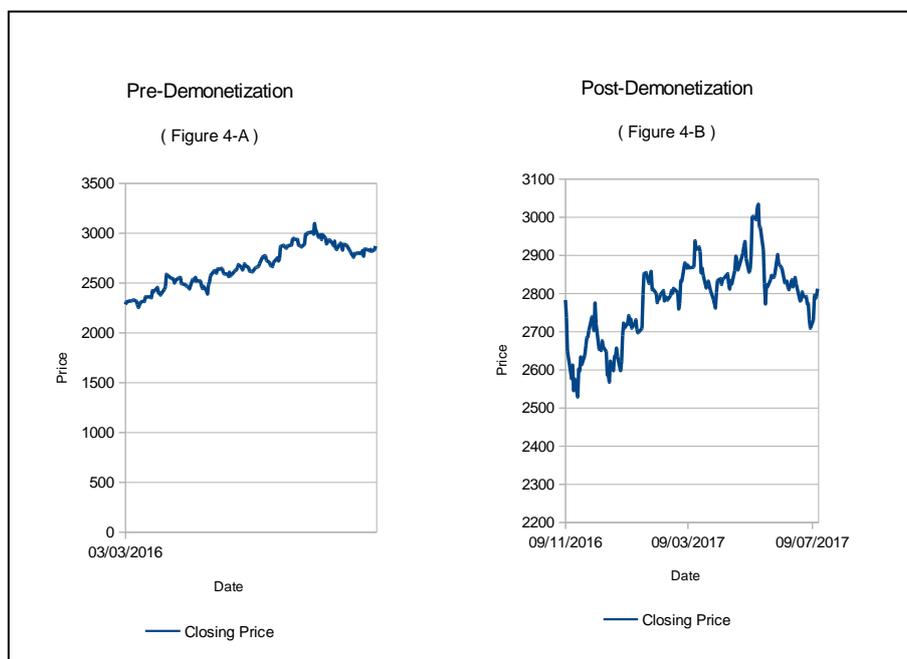


Figure 4: Bajaj Auto Ltd.

Based on the analysis in Figure-4 it can be inferred that demonetization has a positive impact on the stock price of Bajaj Auto Ltd.

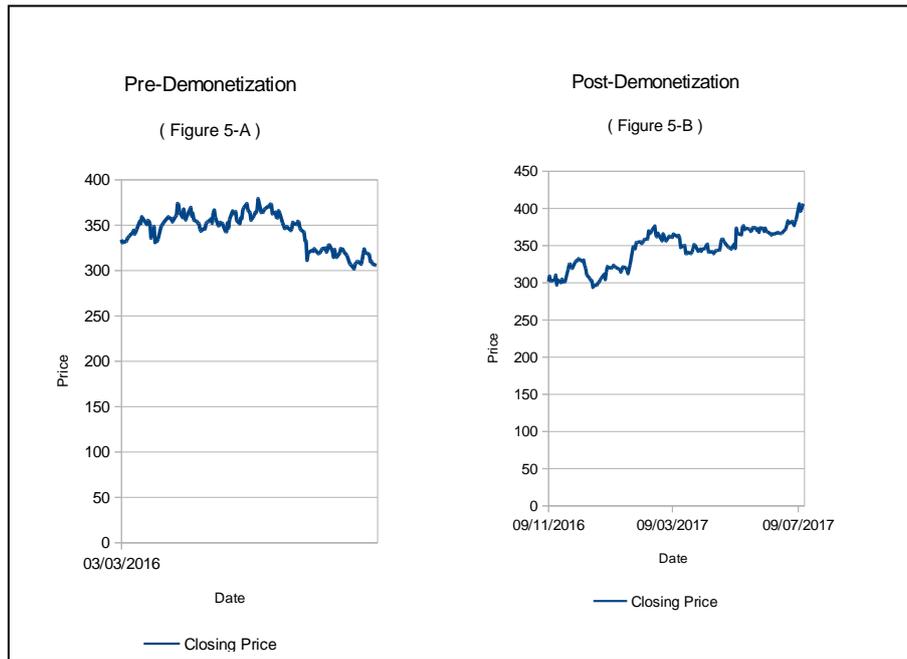


Figure 5 Bharti Airtel Ltd.

Based on the analysis in Figure-5 it can be inferred that demonetization has a positive impact on the stock price of Bharti Airtel Ltd.

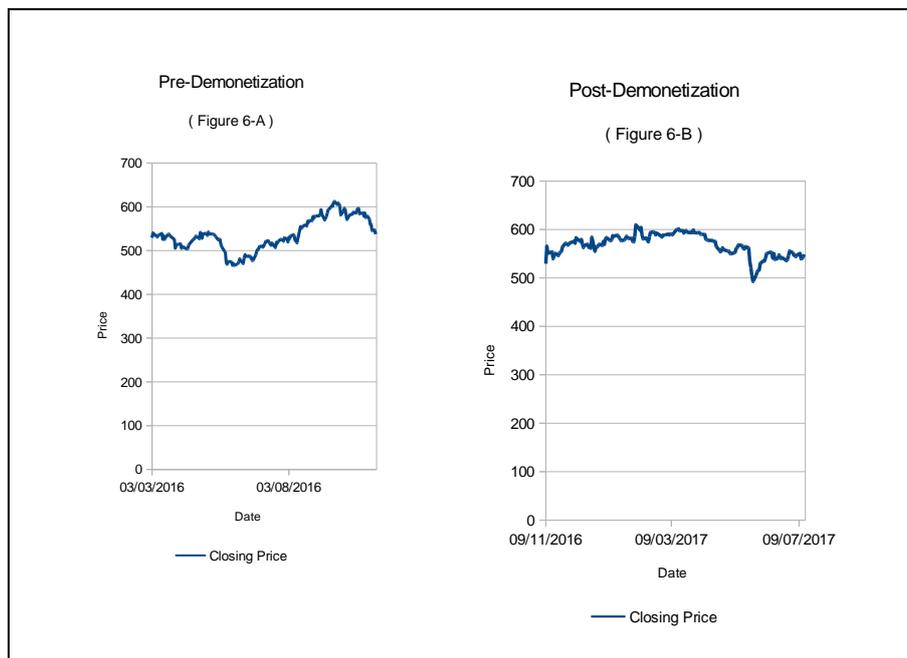


Figure 6: Cipla Ltd.

Based on the analysis in Figure-6 it can be inferred that demonetization has no impact on the stock price of Cipla Ltd.

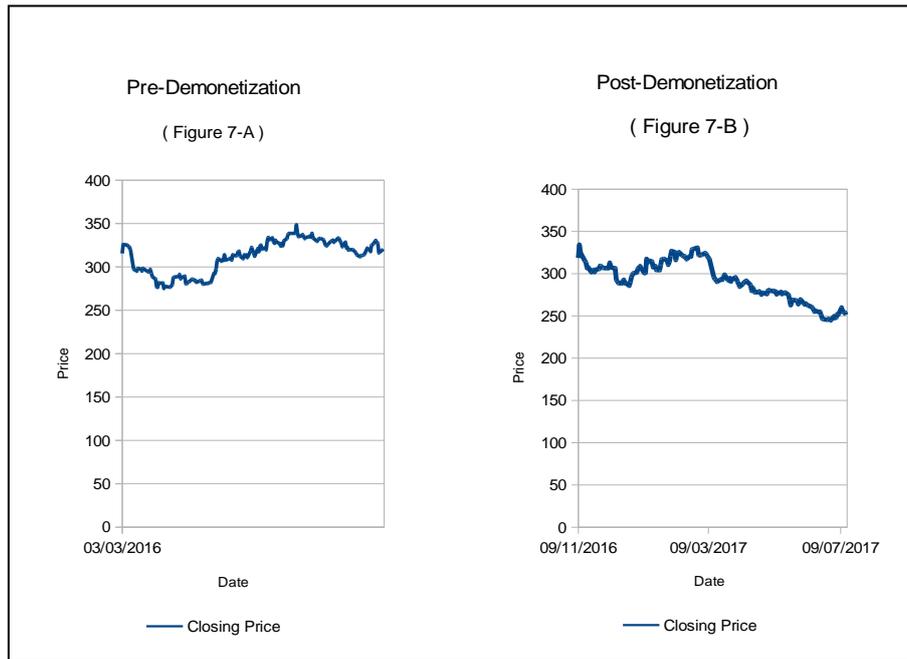


Figure 7: Coal India Ltd

Based on the analysis in Figure-7 it can be inferred that demonetization has a negative impact on the stock price of Coal India Ltd.

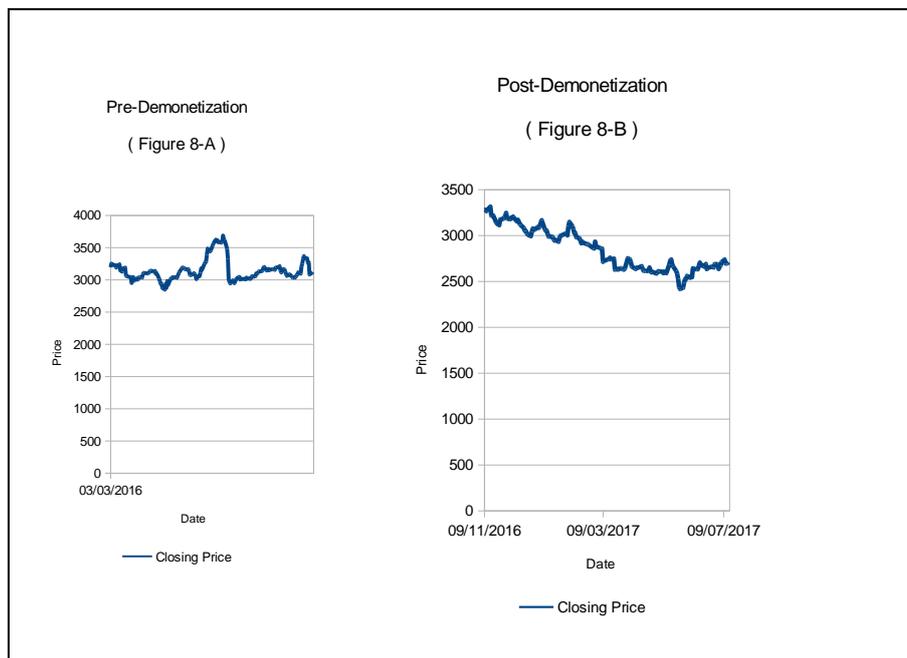


Figure 8: Dr. Reddy's Laboratories Ltd.

Based on the analysis in Figure-8 it can be inferred that demonetization has a negative impact on the stock price of Dr. Reddy's Laboratories Ltd.

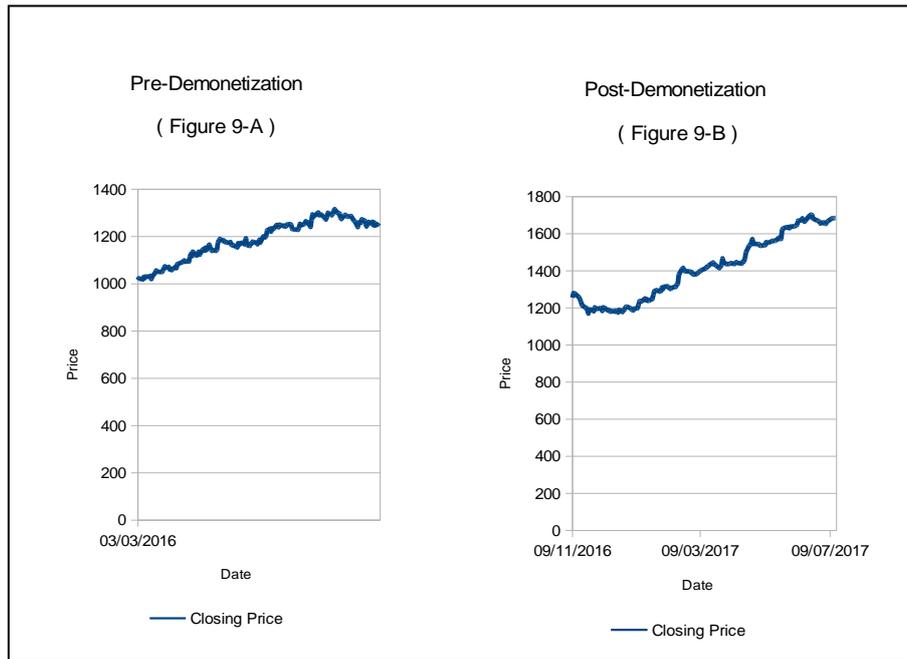


Figure 10: HDFC Bank Ltd.

Based on the analysis in Figure-9 it can be inferred that demonetization has a positive impact on the stock price of HDFC Bank Ltd.

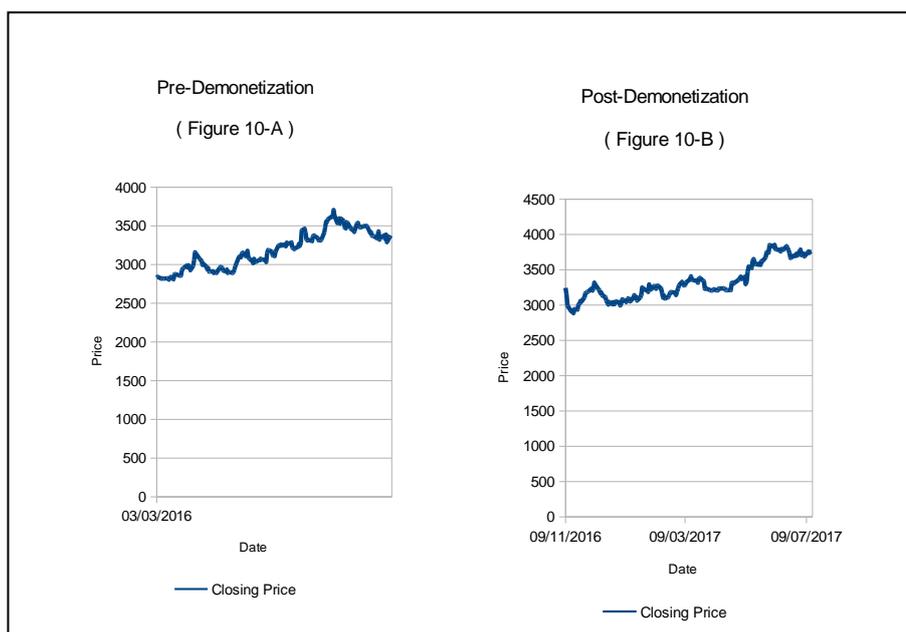


Figure 9: Hero MotoCorp Ltd.

Based on the analysis in Exhibit-10 it can be inferred that demonetization has positive impact on the stock price of Hero MotoCorp Ltd.

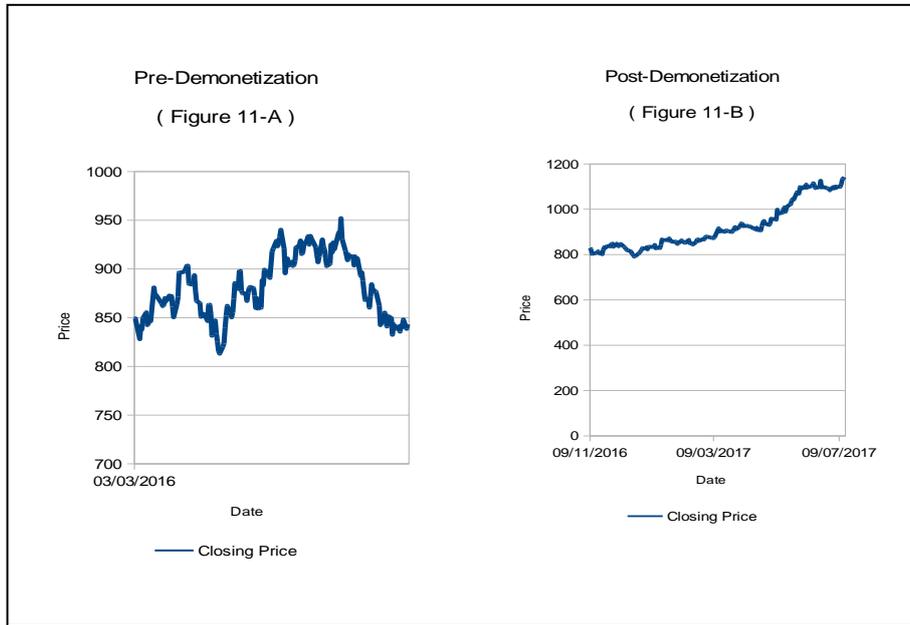


Figure 11: Hindustan Unilever Ltd.

Based on the analysis in Figure-11 it can be inferred that demonetization has a positive impact on the stock price of Hindustan Unilever Ltd.

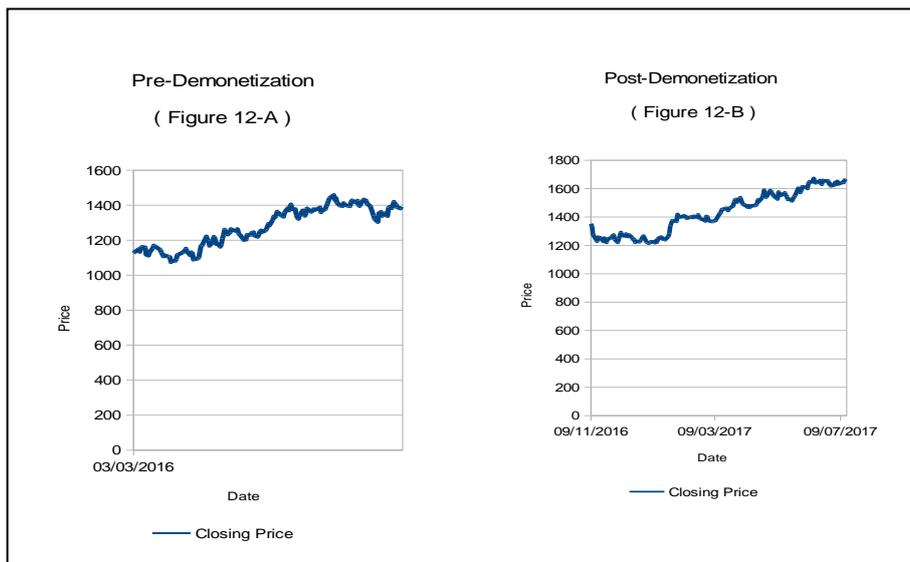


Figure 12: Housing Development Finance Corporation Ltd.

Based on the analysis in Figure-12 it can be inferred that demonetization has a positive impact on the stock price of Housing Development Finance Corporation Ltd.

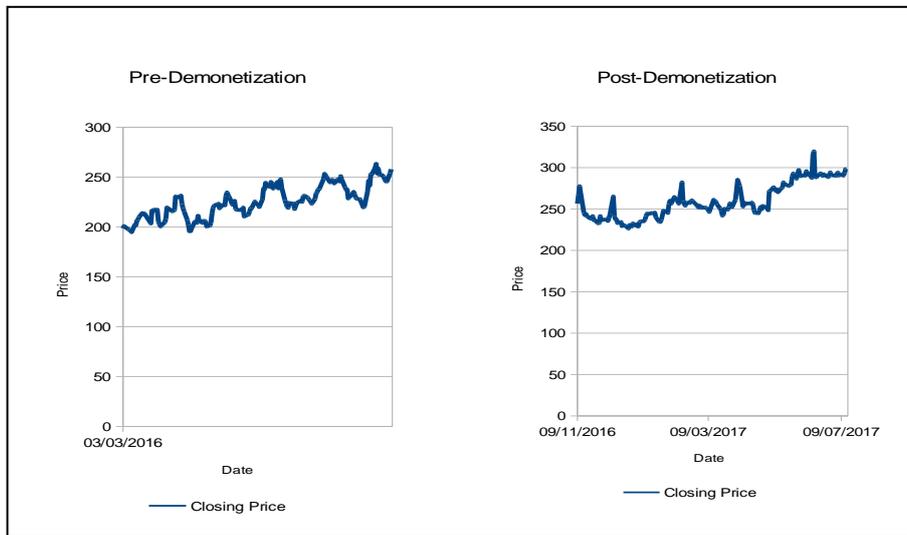


Figure 13: ICICI Bank Ltd.

Based on the analysis in Figure-13 it can be inferred that demonetization has a positive impact on the stock price of ICICI Bank Ltd.

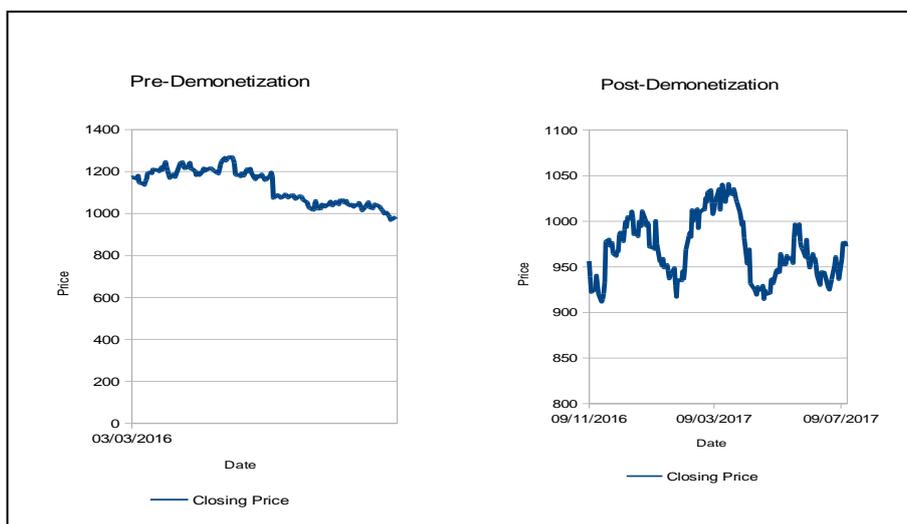


Figure 14: Infosys Ltd.

Based on the analysis in Figure-14 it can be inferred that demonetization has no impact on the stock price of Infosys Ltd.

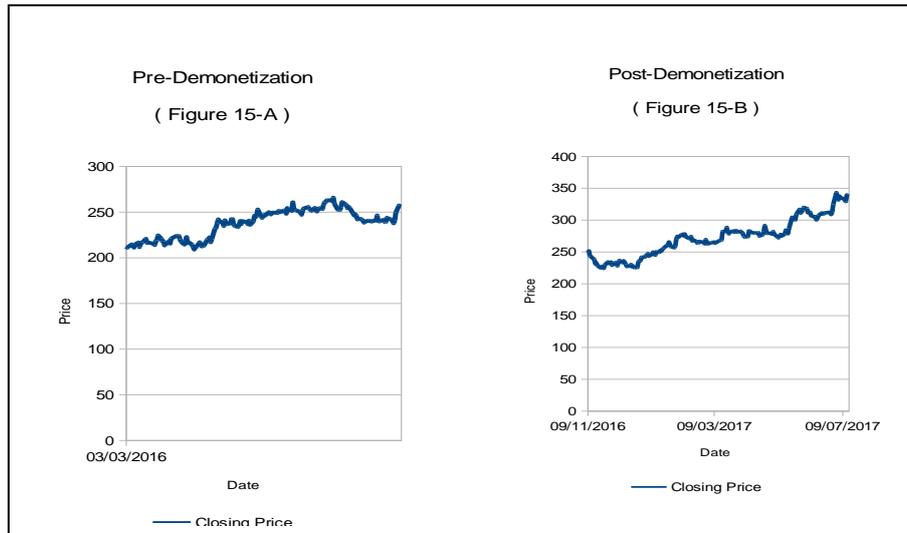


Figure 15: ITC Ltd.

Based on the analysis in Figure-15 it can be inferred that demonetization has positive impact on the stock price of Adani Ports and Special Economic Zone Ltd.

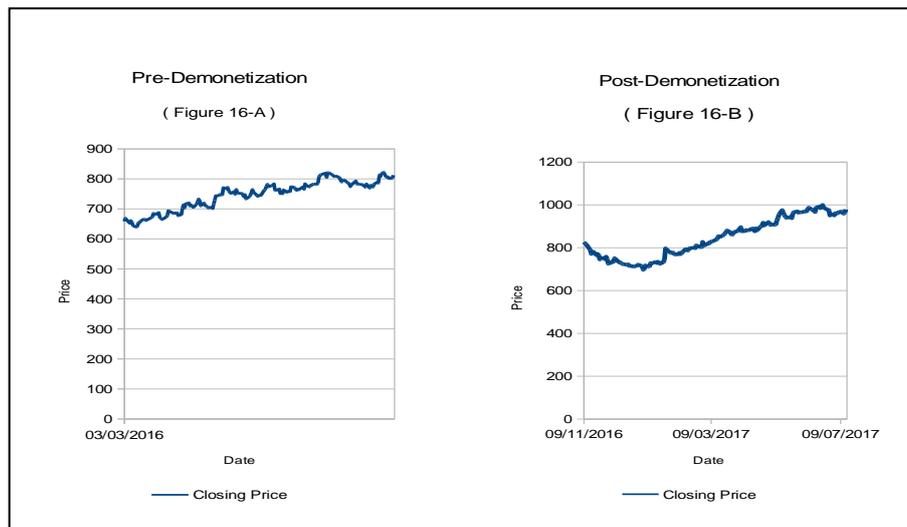


Figure 16: Kotak Mahindra Bank Ltd.

Based on the analysis in Figure-16 it can be inferred that demonetization has a positive impact on the stock price of Kotak Mahindra Bank Ltd.

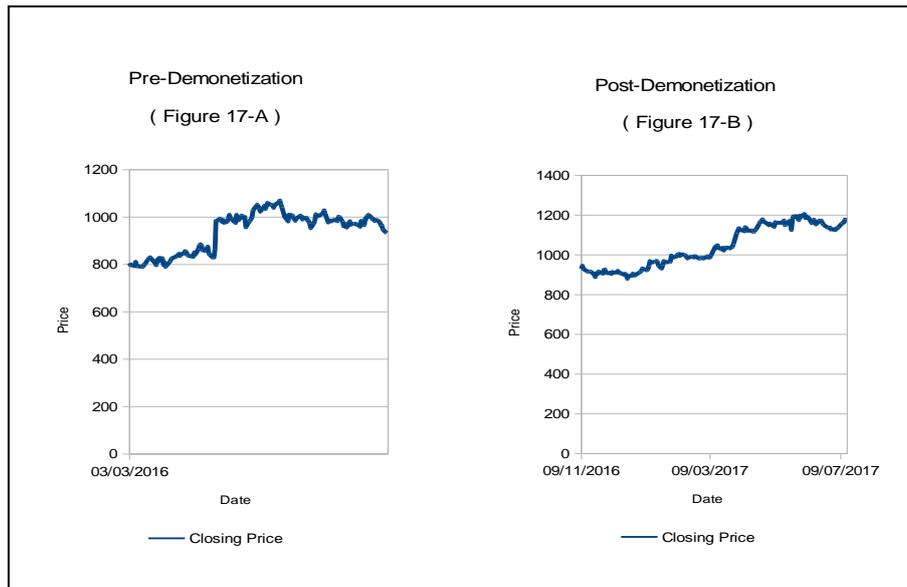


Figure 17: Larsen & Toubro Ltd.

Based on the analysis in Figure-17 it can be inferred that demonetization has a positive impact on the stock price of Larsen & Toubro Ltd.

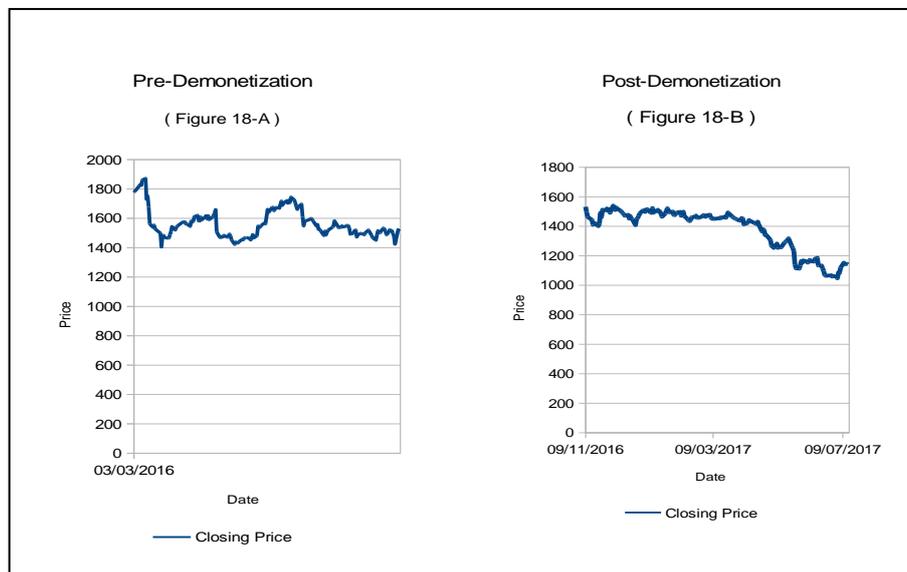


Figure 18: Lupin Ltd.

Based on the analysis in Figure-18 it can be inferred that demonetization has a negative impact on the stock price of Lupin Ltd.

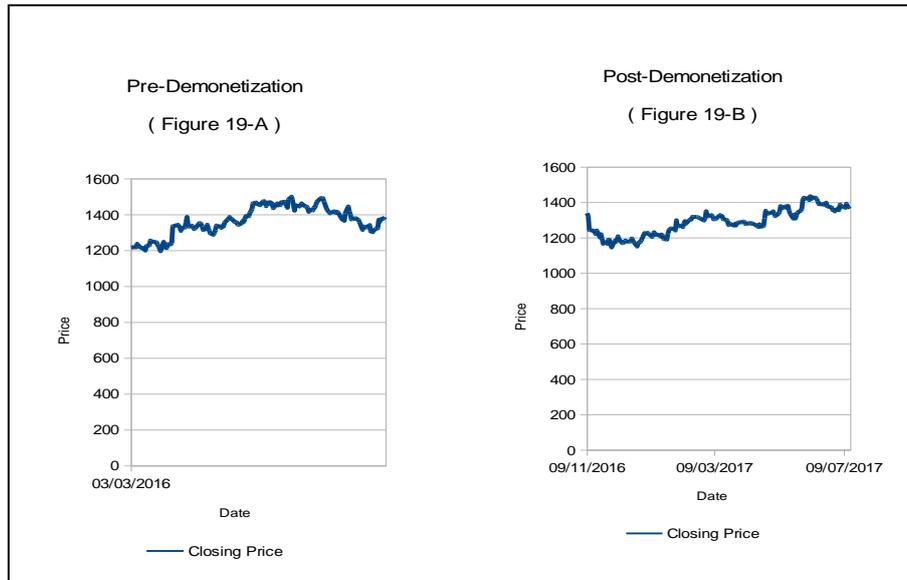


Figure 19: Mahindra & Mahindra Ltd.

Based on the analysis in Figure-19 it can be inferred that demonetization has positive impact on the stock price of Mahindra & Mahindra Ltd.

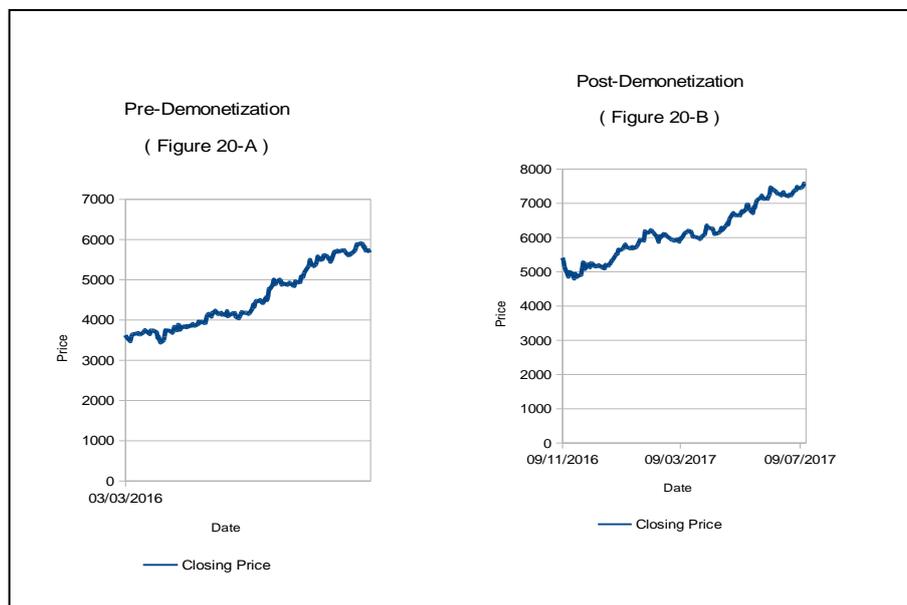


Figure 20: Maruti Suzuki India Ltd.

Based on the analysis in Figure-20 it can be inferred that demonetization has positive impact on the stock price of Mahindra & Mahindra Ltd.

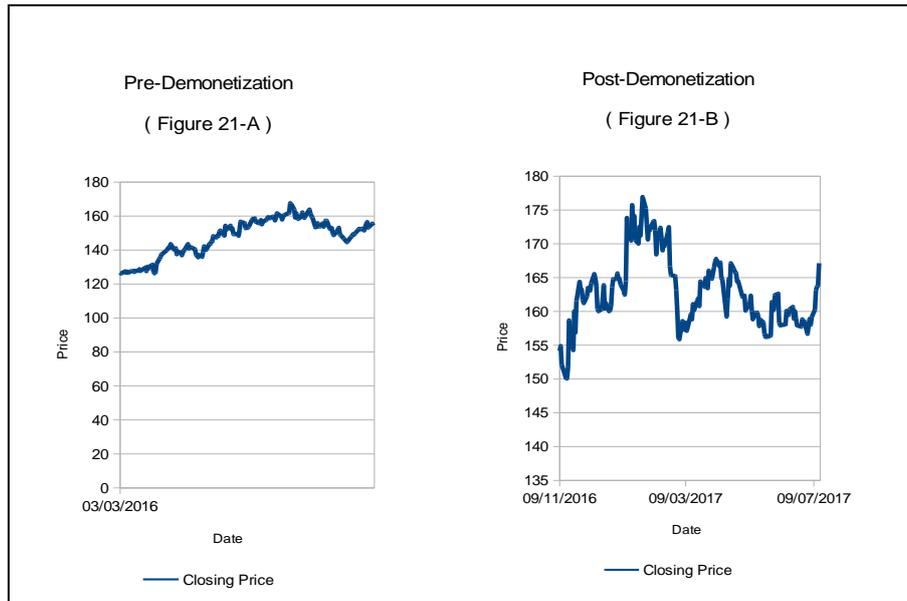


Figure 21: NTPC Ltd.

Based on the analysis in Figure-21 it can be inferred that demonetization no positive impact on the stock price of NTPC Ltd.

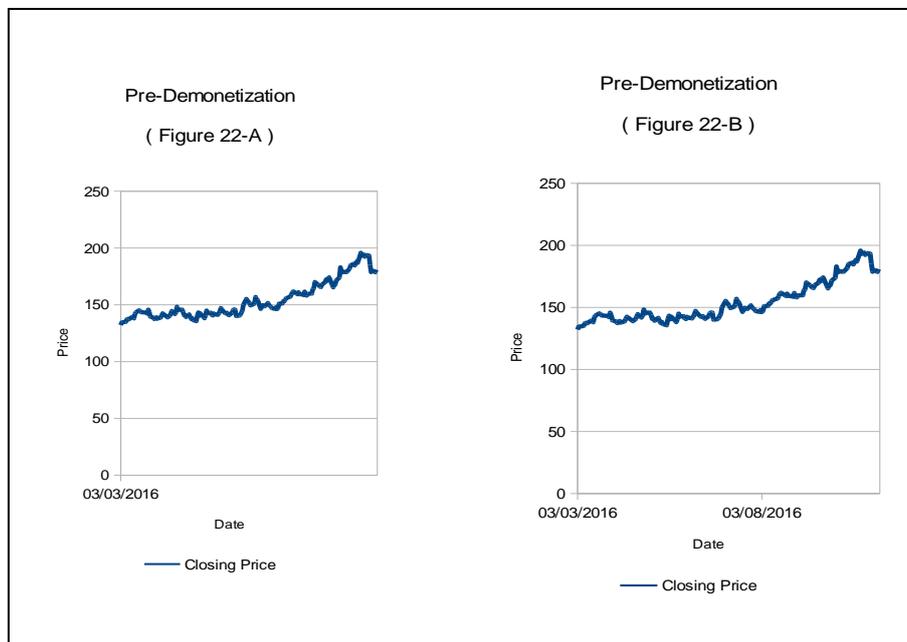


Figure 22: Oil & Natural Gas Corporation Ltd.

Based on the analysis in Figure-22 it can be inferred that demonetization has negative impact on the stock price of Oil & Natural Gas Corporation Ltd.

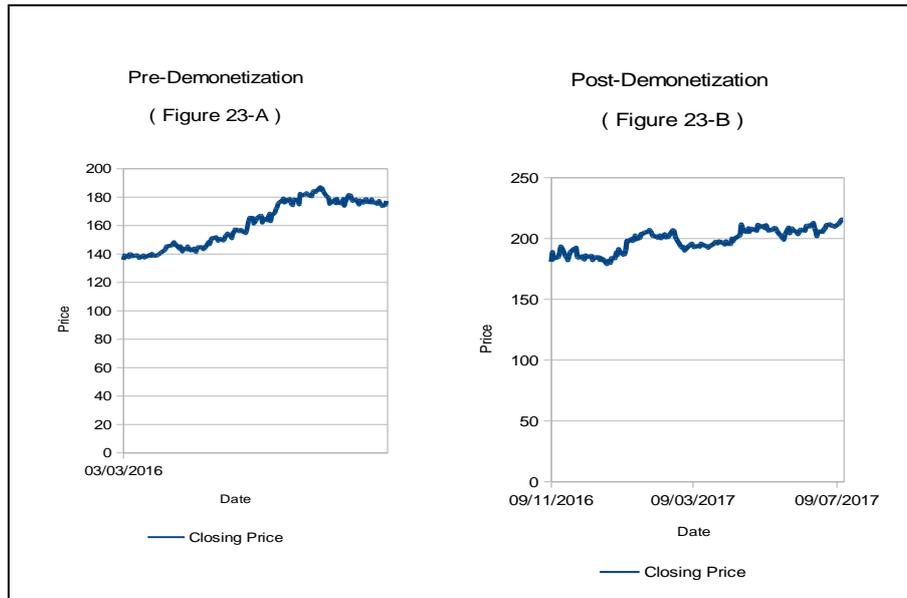


Figure 23: Power Grid Corporation of India Ltd.

Based on the analysis in Figure-23 it can be inferred that demonetization has a positive impact on the stock price of Power Grid Corporation Of India Ltd.

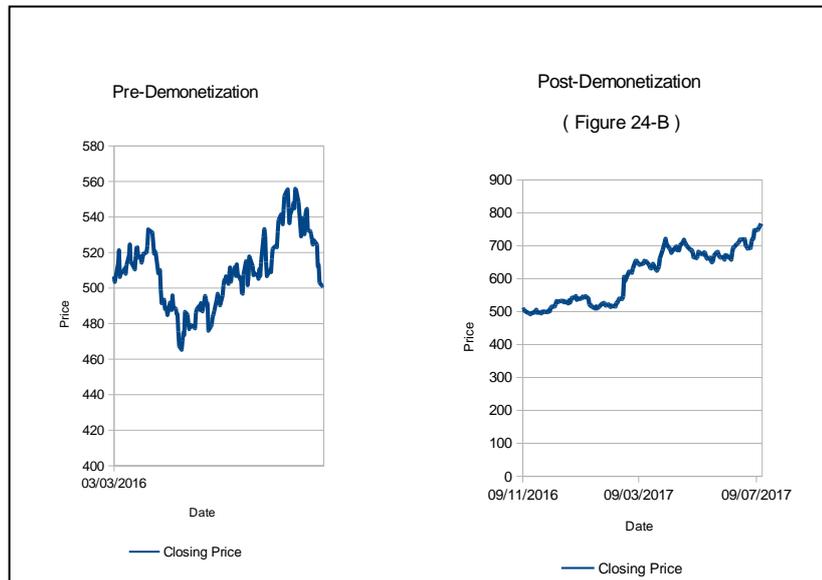


Figure 24: Reliance Industries Ltd.

Based on the analysis in Figure-24 it can be inferred that demonetization has a positive impact on the stock price of Reliance Industries Ltd.

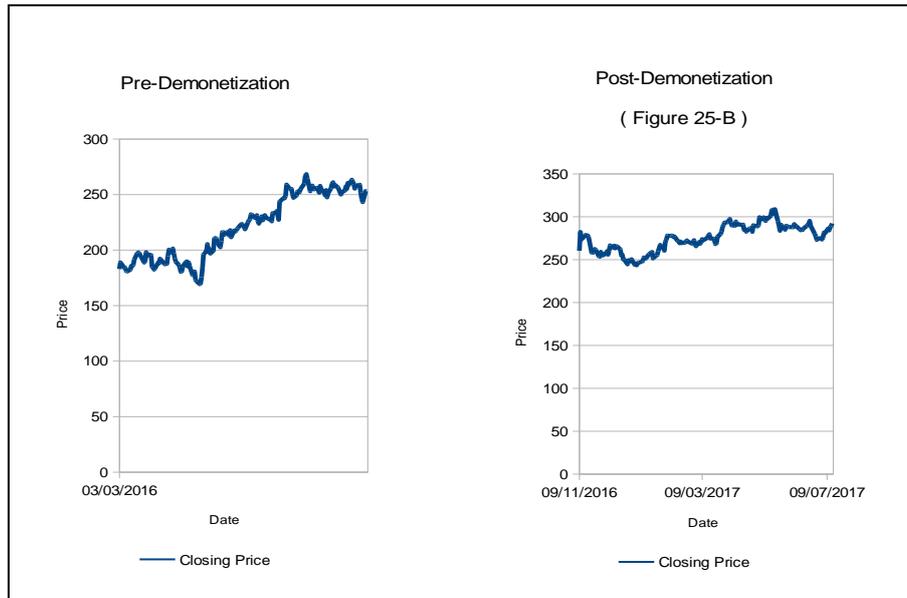


Figure 25: State Bank of India

Based on the analysis in Figure-25 it can be inferred that demonetization has a positive impact on the stock price of State Bank of India.

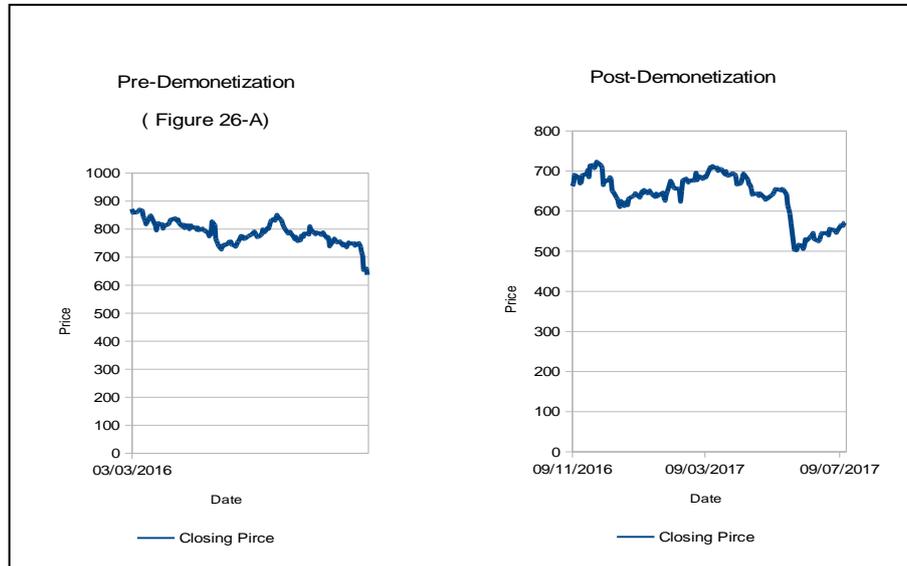


Figure 26: Sun Pharmaceutical Industries Ltd.

Based on the analysis in Figure-26 it can be inferred that demonetization has a negative impact on the stock price of Sun Pharmaceutical Industries Ltd.

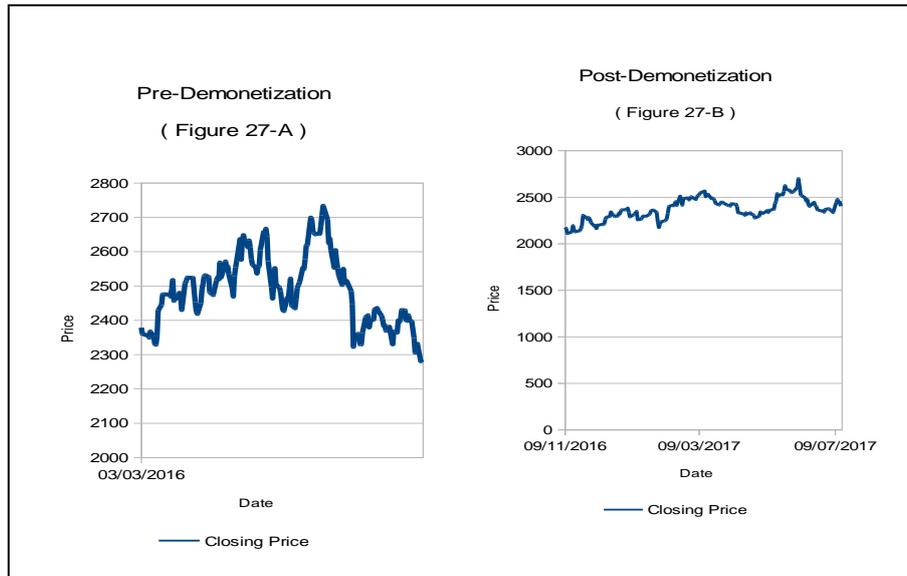


Figure 27: Tata Consultancy Services Ltd.

Based on the analysis in Figure-27 it can be inferred that demonetization has a positive impact on the stock price of Tata Consultancy Services Ltd.

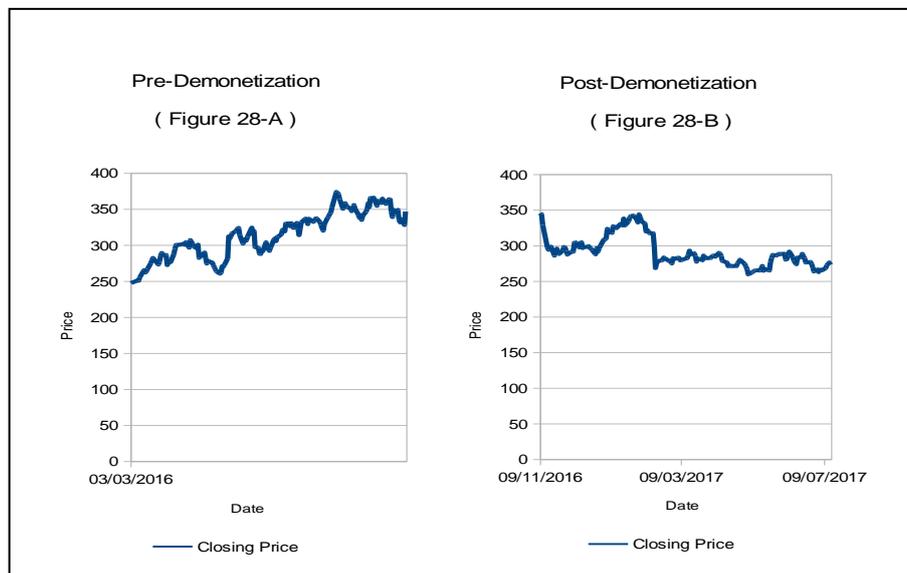


Figure 28: Tata Motors - DVR Ordinary

Based on the analysis in Figure-28 it can be inferred that demonetization has a negative impact on the stock price of Tata Motors - DVR Ordinary.

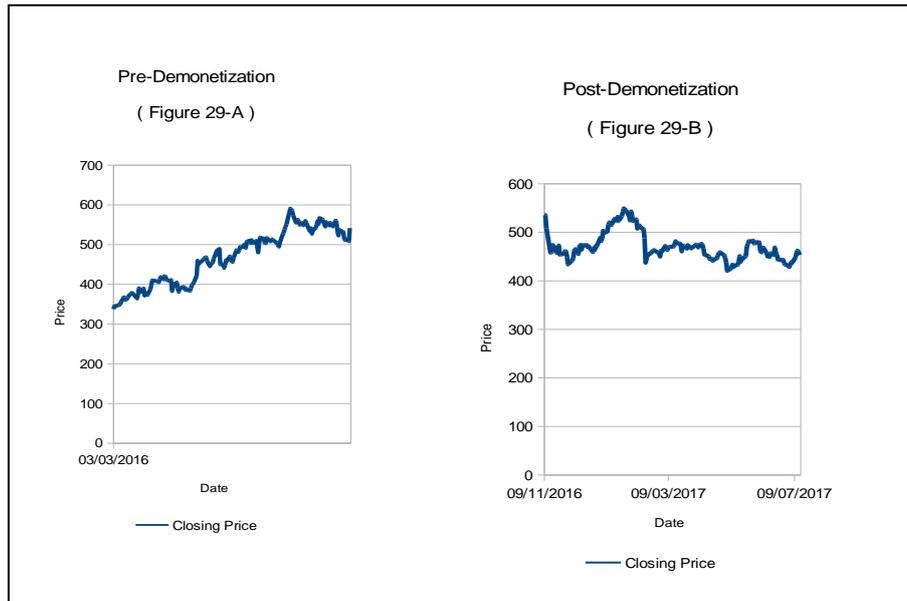


Figure 29: Tata Motors Ltd.

Based on the analysis in Figure-29 it can be inferred that demonetization has a negative impact on the stock price of Tata Motors Ltd.

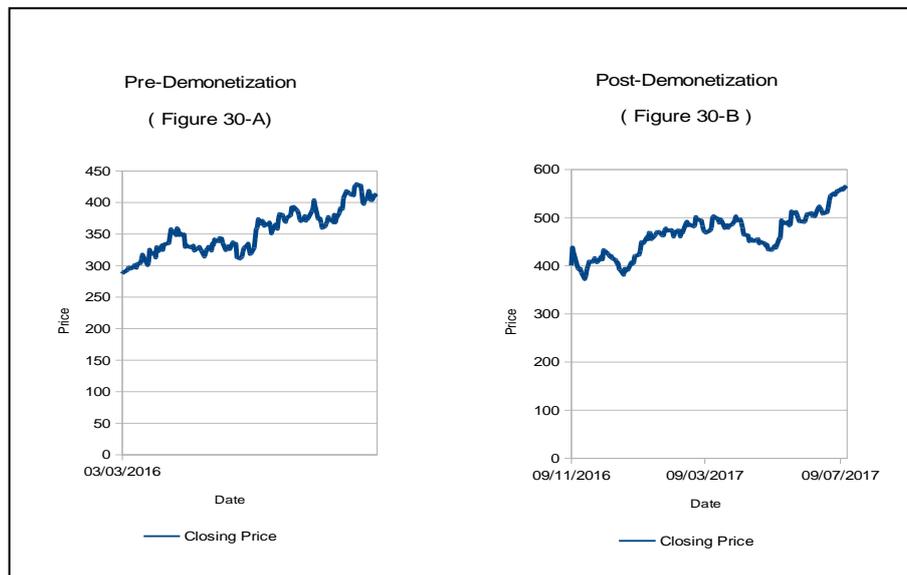


Figure 30: Tata Steel Ltd.

Based on the analysis in Figure-30 it can be inferred that demonetization has a positive impact on the stock price of Tata Steel Ltd.

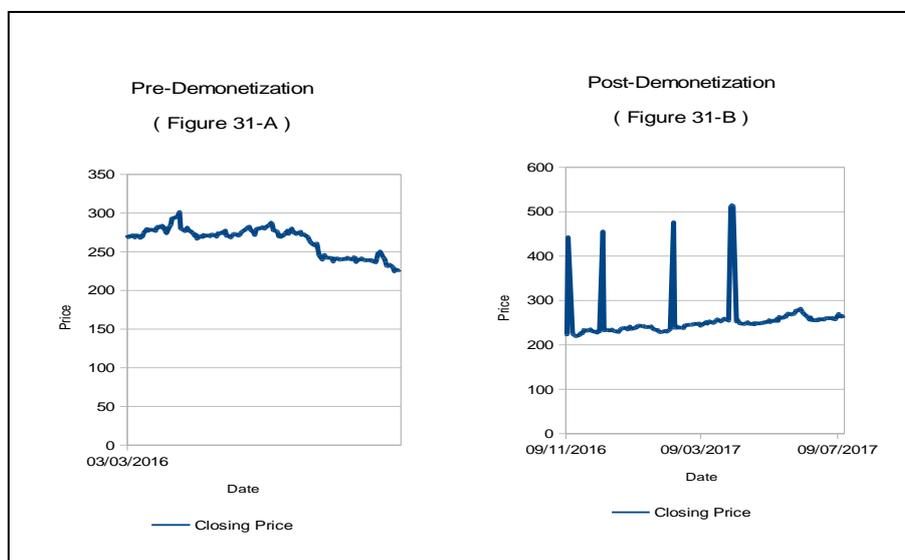


Figure 31: Wipro Ltd.

Based on the analysis in Figure-31 it can be inferred that demonetization has a positive impact on the stock price of Wipro Ltd.

Inference

The empirical evidence was very similar to that of (Sandeep Kaur. 2016.). Also, the findings of Singh & Singh (2016) is in congruence with the graphical evidence. Hence, it can be summarized that the decision of demonetization by the government has the following impact on the company through stock price movements.

Sr. No.	Name of Company	Impact on Company
1	Adani Ports and Special Economic Zone Ltd.	Positive Impact
2	Asian Paints Ltd.	No Impact
3	Axis Bank Ltd.	No Impact
4	Bajaj Auto Ltd.	Positive Impact
5	Bharti Airtel Ltd.	Positive Impact
6	Cipla Ltd.	No Impact
7	Coal India Ltd.	Negative Impact
8	Dr. Reddys Laboratories Ltd.	Negative Impact
9	HDFC Bank Ltd.	Positive Impact
10	Hero MotoCorp Ltd.	Positive Impact
11	Hindustan Unilever Ltd.	Positive Impact
12	Housing Development Finance Corporation Ltd.	Positive Impact
13	ICICI Bank Ltd.	Positive Impact

Sr. No.	Name of Company	Impact on Company
14	Infosys Ltd.	No Impact
15	ITC Ltd.	Positive Impact
16	Kotak Mahindra Bank Ltd.	Positive Impact
17	Larsen & Toubro Ltd.	Positive Impact
18	Lupin Ltd.	Negative Impact
19	Mahindra & Mahindra Ltd.	Positive Impact
20	Maruti Suzuki India Ltd.	Positive Impact
21	NTPC Ltd.	No Impact
22	Oil & Natural Gas Corporation Ltd.	Negative Impact
23	Power Grid Corporation Of India Ltd.	Positive Impact
24	Reliance Industries Ltd.	Positive Impact
25	State Bank Of India	Positive Impact
26	Sun Pharmaceutical Industries Ltd.	Negative Impact
27	Tata Consultancy Services Ltd.	Positive Impact
28	Tata Motors - DVR Ordinary	Negative Impact
29	Tata Motors Ltd.	Negative Impact
30	Tata Steel Ltd.	Positive Impact
31	Wipro Ltd.	Positive Impact

Table 1: Impact of Demonetisation on Companies

Findings

As per the above analysis of companies further grouped industry-wise in order to study the impact of demonetization on the industries the following three categories of impact are as follows:

- Positive Impact: Port, Auto-Ancillary, Telecom, Bank, FMCG, Housing Finance, Power, Steel and Infrastructure.
- Negative Impact: Mining and Pharma.
- No Impact: Paint and IT.

Positive Impact		Negative Impact		No Impact		Total	
Count	%	Count	%	Count	%	Count	%
19	61.29	7	22.58	5	16.13	31	100

Table 2: Summary of Findings

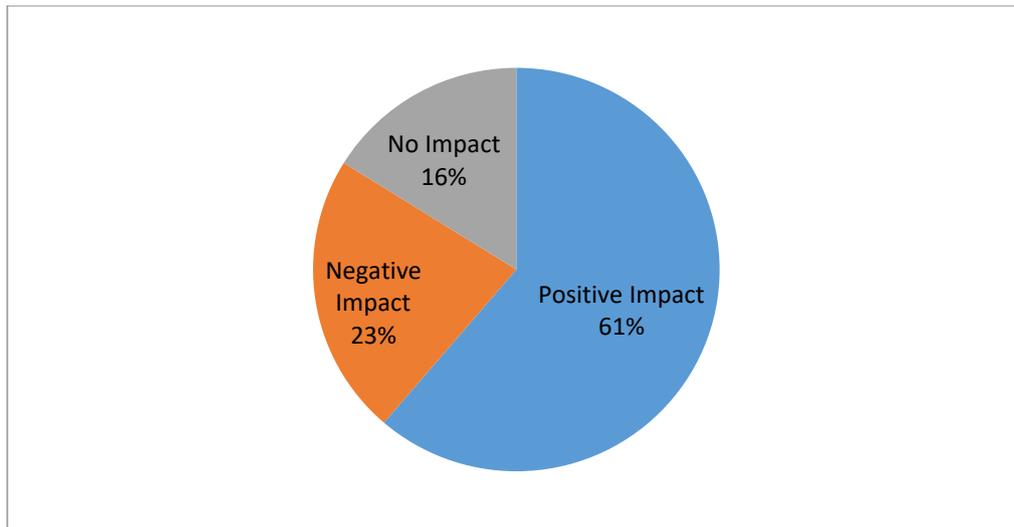


Figure 32: Impact of Demonetisation on SENSEX

Results of Hypothesis Testing

Based on the above analysis the null hypothesis is rejected and hence the alternative hypothesis “Announcement of Demonetization significantly influences the market price of share” cannot be rejected at 95% confidence level.

Limitations of the Study

The present study relies only on secondary sources of data to study the impact of Demonetization on the volatility of stock prices of select companies in BSE-SENSEX.

Conclusion

This research paper studied the impact of demonetization on the stock price. The study was done with specific reference to companies of BSE-SENSEX. The explored results showed that the relationship between the two changes during demonetization as compared to the pre and post period of demonetization. The results of the study indicate that demonetization has a positive impact on the volatility of stock prices of select companies in BSE-SENSEX.

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Impact of Online Retailers on Offline Retailers with special reference to Cosmetics

Mohd. Osaid Koti¹

Abstract

The paper aims to study the influence of Online Advertising of Cosmetics on Offline Retailers. The beauty industry can be broadly categorized into services and products spread across several segments such as skin care, hair care, color cosmetics, oral care and body fragrances. Factors like rising disposable income, rapid urbanization and changing rural consumption patterns, rising literacy rates and a growing segment of independent women in almost all tiers of cities. This research paper tries to unearth the reasons for and impact of online advertisements (retailers) on Offline Retailers. The paper also tries to highlight the differential impact of these online advertisements on the psyche of men and women when subjected to these ads over a period of time.

Key words: *Online Retailing, Stereotype, Cosmetics, Fairness cream, Gender Difference in Purchase Behavior*

1.0 Introduction

India is a culturally diverse country resulting in racial stereotyping which has affected the society across the globe since centuries. Over the years, different forms of media has evolved and have played a significant role in reemphasizing such beliefs (racial stereotyping). Advertisement is no different. Indian media houses have also given a lot of prominence to fair skin tones and thus this strong persuasive nature of advertisements have played an important role in opinionating people's mind.

Beauty has been an obsession for people across the globe from time immemorial and India is no exception. For instance, fairness creams or the creams that promises the enhanced fairness of the customer within a limited period of time has been a fad in the country for a long time. These creams, unlike the popular belief, attract both men and women equally. While these fairness creams are sold to men and women as separate target audience, the communication foundation remains same. A protagonist who tells others to use the cream to be fairer and subsequently successful in life. Still there exist subtle differences in the advertising which is targeted on men and women differently.

This paper tries to differentiation the impact of Online Retailers on Offline Retailers and how it influences consumer's purchasing behavior with reference to Cosmetics. The paper is arranged as follows:

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The next section explains the Online Advertising (web advertising) and its involvement in the promotion and delivery of products and services. This is followed by a section on Cosmetics, specifically skin care segment. Next segment joins these two strands of literature, viz., Online Advertising and Skin Care and how it influences the cosmetic market.

The second section defines the objectives of the paper. Section third, justifies the research methodology adopted. The fourth section is about findings and the last section concludes the paper.

1.1 Online Advertising

Online Advertising, also referred to as web advertising, is generally promotion of products or services over the Internet. The Internet provides a broad scope for advertising. It refers to the marketing strategy that involves the use of the internet for the promotion of products by delivering the marketing messages to the larger consumers. It includes delivering ads to internet users via websites, e-mail, ad supported software's, text messaging and internet enabled cell phones. According to Philip Kotler in Marketing Management Millenium Edition, he has mentioned that internet population is younger, more affluent and better educated. He has also pointed out that they easily find their way onto the internet.

As per IAB Internet Advertising Revenue Report, the global digital advertising market grew 21% to \$88 billion in 2017, the survey was conducted by PwC.

Also, it is important to note that in online marketing, it is the consumer, not the marketer, who gives permission and controls the interaction. Companies are striving to know how the consumers will respond to their marketing tactics. The study of consumer buying behavior has become a concern for the companies, as they may learn how consumers choose their goods and services, and what factors are influencing their choices.

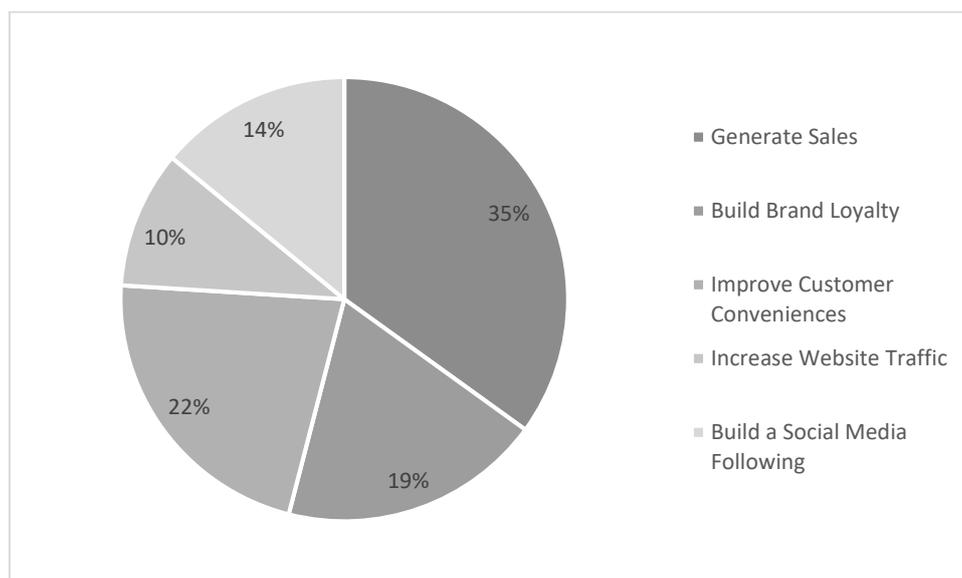


Figure 1: Goals of Online Advertising

Dr. Parul Deshwal, in his article Online advertising and its impact on consumer behavior, mentioned about the Goals of Online Advertising. Online advertising is a type of mass communication which is based on the traditional form of advertising but develops its own communication strategies in correlation with the new technical and medium based requirements. Broadly, online advertising is about delivering advertisements to Internet/online users via Web sites, e-mail, ad-supported software and Internet-enabled smart phones. Examples of online advertising include contextual ads on search engine results pages, banner ads, Rich Media Ads, Social network advertising, interstitial ads, online classified advertising, advertising networks and e-mail marketing, including e-mail spam.

Online advertisement-Types

There are many different types of online advertising, but which one(s) should your business use? From Display Ads to SEO to PPC, here is your complete guide to online advertising.

Display Advertising

Display advertising is a type of online paid advertising, typically using images and text. The most popular forms of display ads are banners, landing pages (LP's) and popups. Display ads differ from other ads because they do not show up in search results.

Search Engine Marketing & Optimization (SEM) & (SEO)

SEM and SEO are two types of online advertising that promote content and increase visibility through searches.

Social Media

There's no doubt that social media advertising just keeps growing and growing each year. Consider these numbers: There are 1.65 billion active mobile social accounts globally with 1 million new active mobile social users added every day. According to the Hootsuite social media advertising statistics, social media advertising budgets have doubled, worldwide, from \$16 billion to \$31 billion in the past 2 years alone.

The two types of social media online advertising are organic, an online word-of-mouth technique, and paid. Placing paid ads, promoted posts or sponsored stories are a popular way to reach more of the demographic of the company, without paying a bundle. As you can see from the chart below, Facebook and Twitter are the most popular social media platforms for companies to reach potential new customers with LinkedIn a popular avenue for B2B sales.

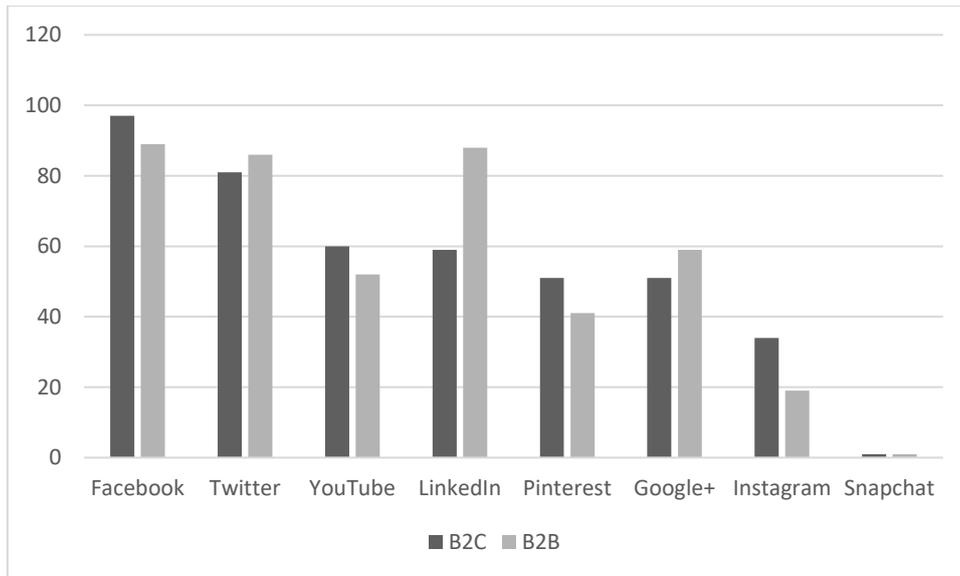


Figure 2: How Marketers use Social Media? Percent of B2C and B2B marketers who use the following social media platforms²

Affiliate Marketing

Affiliate marketing is promoting a company’s product while earning a commission for each sale that was made. It’s essentially a 3-party advertising agreement between the advertiser, publisher and consumer. It’s widely adopted with bloggers who have large numbers of followers and are looking to gain passive income.

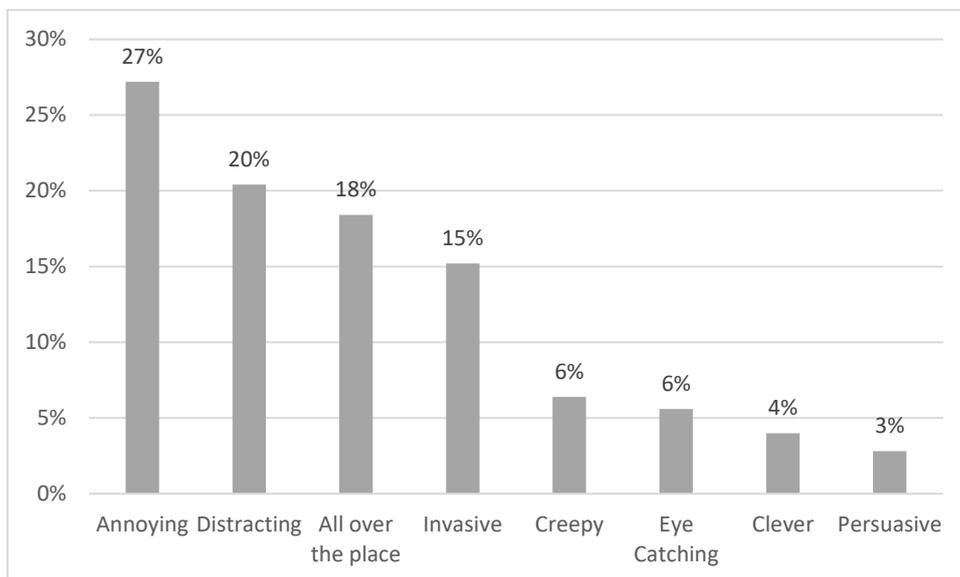


Figure 3: Consumer Behaviour towards Online Advertisement (Author’s compilation as on 2018)

² Source: <https://www.perion.com/blog/8-types-online-advertising-need-know/>, (Accessed on December 2018)

1.2 Cosmetics - Skin Care

Skin Care is defined by the Oxford Dictionary as “*The use of cosmetics to care for the skin*”. Human since ages have been desiring fair skin because of their assumption that fair skin is a sign of beauty. Many countries worldwide are biased with skin colour. There has always been an obsession for fair skin and hence most of the people use homemade products to have fair skin. Products such as turmeric, honey, milk, etc. have been on top of the list for making their skin lighter in shade.

The FMCG companies found an opportunity in the need for a fairer skin for people even across genders and across geographies. The reason for this favourable opportunity is provided by young population, increase working class population and especially female working population. As per the report published by Reuters, 2015, researchers have forecasted a shift from offline to online cosmetic purchases.

Companies like Dabur, Himalaya, Amway etc. have all entered the skin care product market and are mainly focusing on fairness products. In a report published by Sandhya Nair, in April 2018, titled “India Fairness Cream & Bleach Market Overview, 2018-2023”, it is estimated that fairness cream & bleach market of India will grow with a CAGR of more than 9% in the forecast period of FY 2017-18 to FY 2022-23. According to the report, the women's fairness cream category is anticipated to achieve market revenues of more than Rs. 5,000 crore by year 2023.

1.3 Skin Care and Online Advertising

The digital world has led to new challenges, opportunities and risks for the Cosmetic industry. The industry is in the phase of massive disruption. The evolution of the digital world has helped consumers in experiencing brands and products in new ways. Consumers now a days have become smarter and the brand owners have to maintain a direct relationship with them or else the one who has will beat those who don't. Also, new technologies make it convenient for beauty lovers to access trends, content and experiences. Consumer buying behavior has shifted to e-commerce versus traditional brick and mortar stores. The shift is not only for basic skin care products, but a range of choices within brands has expanded dramatically.

Social Media is the reason for the new business model which have ushered to disrupt the way brands connect to consumers.

Younger consumers wear make-up to be camera-ready look. A study by Georganna Simpson and Edward Craig (2018), highlights that almost a quarter of women aged 16 – 24 desire to be selfie-ready and want to portray themselves flawless on social media. They also wish to emulate social media celebrities.

Social Media Influencers are those who create an impact on their followers and eventually create customers out of them. Social media is using these influencers who have huge social presence to connect with the customers directly and target them. Then, there are those amateur influencers who are also vital to the industry, these people create videos on beauty application tips and relate more to these consumers.

2.0 Objectives

The Skin Care industry, which includes products that need a feel and touch before purchasing the same is fighting tough times to enter the e-commerce industry. These types of products are the ones which are called as “try before buy”, and it is hampered by the consumer’s need to feel, touch and smell. This industry is a very high level involvement and the consumers put a lot of time and effort to search, decide and finalise products.

The objectives of the study are:

- To study the levels of awareness about skin care products through advertisements
- To study the purchase behavior of skin care products as portrayed through commercials
- To study and analyse the various factors of online commercials influencing in shaping the opinion on fair complexion among the youth

3.0 Research Methodology

For the study, various articles from both Online and Offline sources have been referred. Using various sources which define Consumer Behaviour specifically related to Cosmetics market and skin care in particular, we found that there were not many linkages in the articles which were committed to defining the relationship between how the Online market influences the Offline purchases. Due to the paucity of available literature we used the secondary method wherein we compiled the literature into a single stream which would be of useful for further research and would serve as a base for empirical one.

4.0 Findings

The rising awareness of beauty products, increasing the premium on personal grooming, changes in consumption patterns and lifestyles and improved purchasing power among women are expected to boost the industry.

The market will maintain healthy growth due to the rise in preference for specialised cosmetic products such as organic, herbal and ayurvedic products. Principal areas that are expected to grow include colour cosmetics, fragrances, specialised skin care and make-up cosmetics, he said.

The Indian industry is growing rapidly at a rate of 13-18 percent³, more than that of US or European markets.

The online shopping scenario in India, according to a report by IAMAI, Indian e-commerce market is valued at about Rupees 81,525 crore in 2014 and is expected to cross INR 1,00,000 by end of 2015. While no particular data is available for e-tailing of cosmetics, segments like apparels, footwear and personal items; it is an industry of about INR 5000 Crores. ASSOCHAM 2012 report, expects Indian fragrance industry to be worth \$5B with flavor and F&F ingredient being another \$11B by 2015. Further as per a recent study by Google, it has been observed that women were responsible for driving growth in categories like apparels, beauty and skincare, home furnishing, baby products and jewelry. Looking at the growth trends of the categories, the report also projected that 40 million women are estimated to shop online in India by 2016. According to a global Nielsen report, there has been a five-fold growth in eCommerce sales in past one year for skin care, baby nursing, make-up, deodorants and cosmetics with eCommerce accounting for 5.2% of global FMCG sales by 2016, up from 3.7%. Asia will be the next major growth market.

India has seen exponential growth in the past decade in its online business. Initially the focus was primarily on electronic gadgets and appliances, later on, even the apparel industry joined forces. With easy access to the internet in the country wherein people are mostly glued to their smartphones and can easily be a target for the companies to promote their product, multi-brand and multi-category retailers are finding it easy to reach out these customers. The online channel has witnessed a boom in e-retailing categories such as beauty, personal care, healthcare, home furnishing etc. Also, a large array of global and domestic brands have become accessible to all.

According to Bain & Company, a search engine based queries, Google has experienced the third highest searches related to beauty and hygiene after the apparel and mobile phones. As per “India Cosmetic Market Overview”, Beauty and Personal Care market in India has grown at CAGR 17% over 2011-2016. The market size is projected to reach US\$ 35 billion by 2035. Due to the rise in digital platforms, the cosmetic industry has seen remarkable growth, also rising penetration of smartphones has given an advantage. Increasing involvement of females in workforce along with increasing disposable income has also helped the cosmetic industry to see its demand rise at an exponential rate.

It has also been observed that the physical market has not been able to fulfill the rising demands of the shoppers. The e-retailers have also taken this as an opportunity. Real estate and restricted reach have always remained a challenge for premium brands, whether it is promotion or sales. There was always scope for counterfeit products for these premium brands.

³ Brand Equity, February 09, 2018, (<https://brandequity.economicstimes.indiatimes.com/news/business-of-brands/indias-cosmetics-market-to-grow-by-25-to-20-billion-by-2025/62845033>)

This ecosystem, where premium brands were not able to fill the gap for the shoppers, online retailers like **Nykaa**, **Purple** and **NewU** have been successful in capturing the shoppers looking for access to global brands in this category. Online retail has seen a growth of 32 percent in their sales during 2016, as observed by Euromonitor.

It has also been observed that beauty retailers are showing interest in omnichannel presence. These retailers are focusing on the online channel, but are also of the opinion that brick and mortar stores are also important as they give experience to the customers. Online Retailers such as Nykaa have recently launched brick and mortar stores to showcase their premium products and to give a feel of touch and smell to its customers. A country such as India is facing a land crunch, these online retailers have disrupted the offline market and have given the online shoppers a platform to browse and shop through online channels.

Social media has also seen an increasing trend in a number of people present there and some of the most popular sites such as Pinterest, Instagram are very highly populated by women. This means there is a captive audience every time something is posted online. Not only in terms of reach or presence of the captive audience, but the online medium also affects a company financially. One of the most difficult task for online retailers is to be present all the time to the right customer. As compared to offline advertisements, online advertisements are cheaper and a wider reach, such as AdSense ads, is a great way to generate traffic to your ecommerce website. Search engines are a great way to come on top every time someone searches for a product on search engines.

Online or Offline alone cannot generate positive results for any company. Combining both forms of advertising allows the business to penetrate virtually every niche of the consumer. More importantly, it is not advisable to alienate self from any market.

5.0 Conclusion

India has a very rich history of cosmetic products for beauty care, but the sector was relatively un-organised. While there have been attempts to organize the industry, it is the new-age eCommerce and young entrepreneurs are actually trying to revolutionize the industry and help it achieve its true potential.

There is no doubt that online retailers are posing a challenge to brick-and-mortars, but it is for sure that brick-and-mortars are not dying when it comes to makeup. When it comes to Indian consumers, they still prefer to go and have a feel and smell of the product. While some would rather have a preference over online retailing, but it is necessary to have brick-and-mortar placement, which is really an integral part of the business.

Apart from these, there are many more challenges that exist in the e-commerce beauty world. For instance, it is very easy to promote your product on any online platform, but to get these prospects to complete the shift to your website where they can actually purchase the product is difficult. Other bigger challenge is the transition from any online advertisement to the actual website where the purchase can be done.

But all been given their due considerations, there is an increasing demand of online shopping because of the variety of options for the consumers to choose from and also at a reasonable price and it is also less time consuming.

6.0 Limitations

Although the online market and the offline markets have been an area of study for the marketers and consumer behavior analyst alike, but not much analysis has been done to justify the causation between these two. There has been some correlation between these market purchases but we cannot definitely put forth a reason why would one market influence the purchasing behavior or pattern of the other. This paper is an attempt to highlight some of the available research work and theoretical findings related to this area but does not justify to conclude that one market will definitely influence the viz-a-viz the skin care sector. Further, empirical work can highlight the same.

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