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STRUCTURE OF TELECOM INDUSTRY IN INDIA

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ABSTRACT

Telecom Industry is one of the developing sectors with rising number of mobile and broadband services. Indian telecom industry has experienced a revolution in its growth over the last two and half decade. It has shown sustained growth as a result of increased competitiveness, relaxed restriction, and establishment of Telecom Regulatory Authority of India (TRAI) as an independent regulator. Mobile phone has made it possible to reap the benefits of Telecommunication within the reach of the world's population. It helped to shrink the gap of digital divide. Telecom Industry is very important in the current era due to its contribution in different sectors of the economy. As such the primarily objective of the present paper is to analyze the structural changes of telecom industry in India during the pre reform period and post reform period. It also recommended measures for the development of the Telecom Industry. The present study is based on the secondary sources. The secondary data have been collected from the various published reports, journals and documents available from the various departments such as Telecom Regulatory Authority of India (TRAI), Department of Telecommunication (DOT), Central Statistical Organization (CSO) and Cellular Operator Association of India (COAI) for the present study. The statistical tools Herfindahl-Hirschman Index (HHI) has been used to measure the market concentration of Indian Telecom Industry.

Keywords: *Herfindahl Index, Market concentration, Reform period, Subscribers, Telecom Services.*

1. INTRODUCTION

In the present era of information, Telecom Industry played a key role in the development of the nation. Telecom sector has brought revolutionary changes in the economy with rapid technological advancements and growth in the productivity. Telecommunication is the process that deals with the exchange of information through the application of technology. It has positive and multiplier effect which makes the people to bring in connection in easy and approachable manner either in rural or urban areas. It is one of the world's biggest machines that bind the society with its vast coverage of network and provision of various services. The services of telecom industry help to decrease and bridge the gap of digital divide. Telecom Industry in India is one of the developing sectors with rising number of mobile and broadband services. Indian telecom industry has experienced a revolution in its growth over the last two and half decade. Application of Telecom Services has been widely used in order to cater the present

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technological needs and to face the international competition. It helps the users to access, store, transmit and manipulate information. Services of telecommunication are fixed and wireless cellular services, internet connections, broadband connections, and value added service which helps the information accessible, storable, transmittable and manipulative for the service users. All these services contribute to the socio economic development of the nation. It is not only useful for the purpose of emergency, health, administration, commerce and social services but it also acts as a stimulator in the economic growth and quality of life by creating effective network worldwide which will bring immense benefit [1]. Telecom industry in India is one among the growing industries that is contributing to the development of Indian economy up to great extent. India rank second in terms of mobile subscribers after china [2]. The growing demand for smart devices (smart phones/tablets/smart watches/smart monitoring Devices) along with access of broad band/ internet connections embeds the fabric of connectivity in a society at global level. It is a key factor in the growth of telecom sector. In this backdrop, focus of the study is to examine the structural changes of telecom Industry in India in pre-reform period and post-reform period of the nation.

2. REVIEW OF LITERATURE

The review of literature shows the highlights of various studies conducted by the different authors on Telecom industry in order to put the present study in proper and theoretical perspective. Seetharam and varadharajan (2006) in their paper have concluded that the telecom sector has helped to fill the gap that existed between the developed and developing economies. Telecom is an important ingredient in the growth of economic development of an economy through fulfilling various purposes like the awareness about the prices, job opportunities etc. [3] Sudan (2009) in his paper has analyzed the growth performance of telecommunication Industry in India in recent years and stated that telecom sector has emerged as a winner today to bridge the gap of digital divide [4]. Sarin and Jain (2009) in their study namely effects of mobiles on socio-economic life on urban poor which was conducted in three metropolitan cities with 1774 respondents, founded that the majority of the respondents admitted an improvement in their economic life as well as social life. Mobile phone work as a productive and effective tool for the workers who are self-employed by reducing search and transaction cost for business, intermediaries regarding search of work and enhancing their productivity [5]. Jonas and Maryn (2010) in their paper assessed the impact of information and communication technology by stating the role of mobile phones on the behavior of market in developing countries. This study has also highlighted that there is positive relationship between use of mobile phone technology and country's development at the macro level [6]. Sahoo Pravakar et al., (2012) have assessed the role of infrastructure in economic growth in China. The study states that the heavy investment in infrastructure by China is supported to sustain the growth which in turn reduces the affects of global financial crisis. The study states that there exists

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positive relationship between the development of infrastructure and economic growth in China which in turn clarifies the reason that why china made a large spending in infrastructure development from a longer period [7].

Prasad kiran (2012) in her paper examined the role of mobile phone in attaining sustainable development by addressing the importance of telecom policies, national and economic policies. She also stressed on various applications of mobile technology like m-business, m-education, m-governance etc to excess its benefits in bridging the gap of digital divide within and between countries [8]. Assawatia & Meel (2012) in their study describes ICT tools (Telecom, Television, Radio, Hardware, Software, Electronic media) which supports the process of networking for removing gender gap and empowering women. It also emphasized over the potential of ICT to attain the objective of economic growth, economic development, social development, effective governance etc. It also recommended some strategies to meet the problem of industry while accessing the ICT applications [9]. Podesta John (2013) examined that inclusive economic growth can be attained by raising connectivity which helps to extend the opportunities and decreases the level of vulnerability. It states that connectivity works as silver bullet to attain broad economic growth with great pace at equitable level that brings connectivity between every person either rich or poor [10]. Sanap Mahohar K (2015) in his paper addressed the importance of ICT to eliminate gender gap. ICT favor women in assessing health services, education, political participation, sustainable livelihoods etc. He also stated in his paper that through internet services women are enjoying freedom of sharing their expression, communication which leads to remove gender discrimination and promote human right of women [11].

Jollie N. Alson et al. (2016) in their study have explored the role of smart phone among youths of Philippines and has revealed that the use of mobile phone from educational perspective has the highest priority, using social cites mostly for the socialization like face book, instagram, chat, phone call has got the 2nd preference, where checking emails is at the least preferences of all [12].

The review of various studies has shown the positive impact of telecom sector on economic development, to reduce poverty, gender equality, to access to education, enhance connectivity, and reduce vulnerability among different countries and of the different sectors of the economy. It has examined that how mobile phone has helped to fill the gap between the developed and developing countries. By addressing the importance of Telecom industry, an attempt has been made in the present study to examine the structural changes of Telecom industry in India during the pre-reform period and post-reform period and finally the solution have been recommended.

3. OBJECTIVES & RESEARCH METHODOLOGY

The objectives of the present study are to examine the structural changes of Telecom Industry in India during the pre-reform and post reform period and finally the solution have been suggested for the development of Telecom Industry. The present study is Secondary in the nature. The secondary data has been collected from the various

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published Journals, documents available from Telecom Regulatory Authority of India (TRAI), Department of telecommunication (DOT), Central statistical organization (CSO), Cellular operators Association of India (COAI) and other allied departments for the present study. After the collection of data, Herfindahl-Hirschman Index (HHI) has been used to measure the market concentration of the Telecom industry.

4. FINDINGS OF THE STUDY

Indian telecom industry is completely dominated by the public sector for wire line telecom services before the reform period as there were only state owned telecom companies present there. With the introduction of liberalization in Indian telecom sector, private telecom players got entry in the telecom industry. There was government monopoly in the telecommunication until 1994. Before that no doubt telecom industry contributed to the economy but there was an emergence need to focus on the availability of the network and low cost call rates to develop the capacity and the level of competence, to improve the quality of the telecom service and to bring new technology in the telecom industry. The formulation of the telecom policy contributed to the development of the telecom industry which added to the availability of the qualitative telecom services at reasonable and affordable rates at global level. The number of sellers in the form of private telecom players started rising leading to structural changes in the telecom industry of India. It has raised the degree of sellers which is an important change experienced by the market structure of Indian telecom industry. To study the market concentration for telecom industry, there is need to deal with the telecom industry which is controlled by the existing telecom players. Telecom industry has been moved from monopoly (because of public owned companies only) before the pre-reform period to oligopolistic market structure (with the entry of private telecom companies after the reform). Two important facts emerged that there is increase in the number of telecom players and their relative share in the telecom industry.

Major Telecom players in India can be broadly categorized into two categories i.e. public as well as private sector where public sector has two telecom companies - Bharat Sanchar Nigam Limited (BSNL) and Mahanagar Telecom Nigam Limited (MTNL) and private sector is divided among Indian Companies and Foreign Invested Companies. The structure of telecom industry can be studied under the two sub-divisions i.e. before the reform period and after the reform period.

5. STRUCTURE OF TELECOM INDUSTRY DURING THE PRE REFORM PERIOD

Telecom industry is one of the major industrial sectors in India. Telecom Industry worked completely under the control of government before the adaptation of liberalization. Before 1986, Department of Telecommunications (DOT) was only state owned company that provided telecom services. By the end of 1986, Videsh Sanchar Nigam Limited (VSNL) and Mahanagar Telephone Nigam Limited (MTNL) were state owned companies which were established in 1986 to provide telecom services in India. Thus before the liberalization the main public service

providers were used to meet the telecom services in India i.e. DOT, VSNL and MTNL where MTNL provide telephony services in Delhi and Mumbai, VSNL provided International telecom services in India and DOT provides telecom services in India except Delhi and Mumbai. Complete Monopoly was enjoyed by the public players in the telecom market in India before 1990s. In other words Indian telecom market is highly dominated by the public sector before 1990s.

TABLE-1: STRUCTURE OF TELECOM INDUSTRY DURING THE PRE-REFORM PERIOD

Telecom Company	Year of Establishment	Telecom Circle (Area of Operation)	Public/ Private Telecom Company	Market Share (in %age)	Market Structure
DOT	1985	All India except Delhi and Mumbai	Public	100	Monopoly
VSNL	1986	International Services	Public	100	Monopoly
MTNL	1986	Delhi and Mumbai	Public	100	Monopoly

Source – Telecom Regulatory Authority of India (TRAI) and Department of Telecommunications (DOT).

Indian telecom market has experienced a monopoly of providing telecom services until 1991. Thus in the pre reform period telecom industry has certain limitations because of existing market structure. There had been existence of monopoly practices. In other words Indian telecom market is dominated by the public sector before the reform period as there was hundred percent stakes of public owned telecom companies before the reform period. There was absence of (a) competition; (b) telecom policy; (c) independent regulator in the telecom market. Provision of telecom subscriptions was quite late.

Telecom companies made available subscriptions to the people by taking usually the period of Couple of months. Public telecom companies enjoyed complete market power resulting high market concentration in the telecom market structure. These factors set a limit to the growth of telecom industry in India during the pre-reform period.

6. STRUCTURE OF TELECOM INDUSTRY IN INDIA AFTER 1991

After the reform period, Indian telecom industry opened its market for investment. It has also opened the market for the basic and value added services by the private sector. The steps adopted by the government worked as a boost in the development of Indian telecom sector. This liberalization also made a way for the beginning of mobile or cellular services in India on commercial basis. The process of providing the Cellular services in India was started in the year of 1992 with the completion of bidding process by the telecom players [13]. The first cellular call was made in India in the Kolkata (Calcutta) in 1995. The call was made by Modi telstras Mobile. First cellular network was available in the Kolkata metro city in 1995. The technology used for the provision of cellular services in that period was GSM in India.

6.1.GROWTH IN THE TELECOM SERVICE AREA IN INDIA

Before 2000 Indian economy was divided into twenty one "Telecom circles" but later on there were 22 telecom circles in India. Telecom circles are synonyms to telecom service area that are used officially which were further categorized into A, B, C and metro circles. The states were divided into telecom circle according to their geographical status and size. The high density area came under metro circles. Telecom circle 'A' included the states with high population and circle c covered the population less than others. Thus in 1995; the monopoly of government was broken when bids were done by the private players for telecom circles. Thus during that period eight licenses were granted for the Metro Circles (Mumbai, Delhi, Calcutta and Chennai) where BPL Mobile and Hutchinson Max were granted the license for the metro circle Mumbai, Bharti Cellular and Essar (Ex- Sterling) were granted their license for the metro circle Delhi, Usha martin and Modi Telstra were granted for the Calcutta Metro circle and SkyCell and RPG Cellular were granted their license for the Metro Circle Chennai. After the metro circle, thirty four licenses were granted for the rest of eighteen telecom circles. Cellular services were started in 1995 with the completion of the bidding process in 1994 by the several telecom players. Telecom companies like Airtel and BPL mobile started providing services in 1995. TRAI was set up in 1995 by the government of India to work as regulator with the objective of reducing government intervention in the telecom industry [14]. The establishment of TRAI also made contribution in the framework of telecom policy and the regulation of the tariff. CDMA service has been launched in 2003 in India with high frequency as compared to GSM service. Today majority of telecom players followed GSM technology. DOT was renamed as BSNL in 2000 by the government of India. Calling party pays (CPP) was introduced in India in 2004. Products for lifetime validity had also been introduced in India in 2005. After a time 3G enabled service has been introduced for mobile and data services in India by the public telecom players (BSNL and MTNL) in 2008 and rest of the telecom players were introduced the 3G service in 2010. 4G Service was introduced in 2012 in Kolkata (India).

TABLE -2: PRESENT STRUCTURE OF TELECOM COMPANIES IN INDIA

Major telecom players in India both public as well as private are listed below with their year of establishment, headquarter and the services they provided as regarding the present study i.e. either mobile/fixed or both.

Sr No	Telecom company	Year of establishment	Head quarter	Public Owned/ Private Owned	Telecom services (fixed/mobile or both)
1	MTNL	1986	Delhi and Mumbai	Public	Both
2	Vodafone	1994	Mumbai, Maharashtra, India.	Private	Both
4	Bharti	1995	New Delhi, India	Private	Both

5	Idea	1995	Santacruz East, Mumbai, India	Private	Mobile
6	Tata Teleservices	1996	Mumbai, Maharashtra, India	Private	Both
7	Aircel	1999	Chennai, Tamil Nadu, India.	Private	Mobile
8	BSNL	2000	New Delhi, India	Public	Both
9	Reliance	2003	Navi Mumbai, India	Private	Both
10	Sistema	2008	New Delhi, India	Private	Mobile
11	Quadrant	2008	Haryana, India	Private	Fixed
12	Reliance Jio	2015	Navi Mumbai, India	Private	Mobile
13	Telenor	2009	Connaught place, New Delhi, India	Private	Mobile

Source- compiled from the websites of the telecom companies.

In the above table, telecom companies operating in India have been stated clear the existence of oligopolistic market structure in the Indian telecom market as majority of the share of Telecom subscribers has been controlled by the few of Telecom Companies. BSNL and MTNL are two Public Sector Undertakings companies and rest of the telecom companies are from Private Sector. Telecom companies named BSNL, MTNL, Bharti, Tata, Reliance, Quadrant, Vodafone, and Sistema are providing wire line telecom services in India (TRAI, 2017) where as Bharti, Vodafone, Idea, reliance Jio, BSNL, Aircel, reliance, Telenor, Tata, Sistema, MTNL telecom companies are providing cellular/mobile services.

6.2. SELLER'S CONCENTRATION IN TELECOM INDUSTRY FOR MOBILE SERVICES IN MARCH, 2003:

Different mobile telecom companies that existed in the year 2003 are listed with their subscribers during the period and then herfindahl index is used to analyse the market concentration of mobile companies in the telecom market. All the service providers in the telecom market which were providing mobile services are taken for the calculation of herfindahl index.

TABLE-3 SELLER'S CONCENTRATION FOR TELECOM INDUSTRY (MOBILE) IN MARCH, 2003

Sr. No.	Telecom companies	Mobile subscribers in 2003 (in million)	Market Share (in % age)
1	Bharti	3.07	0.23
2	BSNL	2.29	0.17
3	Hutch	2.16	0.16
4	Idea	1.28	0.09
5	BPL	1.13	0.08
6	Aircel	0.73	0.056

7	Spice	0.64	0.049
8	Escotel	0.59	0.045
9	Reliance	0.54	0.041
10	MTNL	0.35	0.026
11	Tata	0.16	0.012
12	HFCL	0.03	0.002
13	Shyam	0.03	0.002
	Total	13	
	H Index	0.15	

Source-TRAI Report, 2006-07 [15]

The herfindahl index for the mobile service providers in the year 2003 is between 0.15 to to 0.25 (0.15) which clearly indicates the moderate concentration in the market of mobile service providers for the period March, 2003.

6.3 SELLER'S CONCENTRATION IN TELECOM INDUSTRY (MOBILE) IN MARCH, 2007

To analyze the concentration of mobile telecom companies in the year 2007, herfindahl index was used as earlier to measure the market concentration of mobile service providers in the year 2007 which was stated below:

TABLE-4: SELLER'S CONCENTRATION IN TELECOM INDUSTRY (MOBILE) IN MARCH, 2007

S.No	Telecom companies	Mobile subscribers in year 2007 (in million)	Market Share (in%)
1	Bharti	37.14	0.22
2	BSNL	30.99	0.18
3	Reliance	28.01	0.16
4	Hutch	26.44	0.16
5	Tata	16.02	0.097
6	Idea	14.01	0.084
7	Aircel	5.51	0.033
8	MTNL	2.94	0.017
9	Spice	2.73	0.016
10	BPL	1.07	0.0064
11	HFCL	0.15	0.0009
12	Shyam	0.10	0.0006
	Total	165.11	
	H Index	0.158	

Source –TRAI Report, 2006-07

Mobile telecom subscribers were stated for the year 2007 in the above table and their herfindahl index was calculated that is obtained in the above table is 0.158 which indicates the moderate market concentration in the telecom market for the mobile service providers for the year 2007.

6.5 SELLER'S CONCENTRATION IN TELECOM INDUSTRY (FIXED & MOBILE) SERVICES IN MARCH, 2012

In the reform period, Indian telecom industry has gone through various structural changes. There exist various telecom companies; it resulted in raising the level of competency which results in lower tariff in Indian telecom market. The industry has gained various private telecom players where several strategies have been adopted for the provision of subscriptions by the telecom companies. It was done to attract the subscribers in India which resulted in the growth of telecom industry with great pace which can be proved by the fact that in 1991 there was 0.67 percent teledensity which has reached to 78.66 percent in 2012. The present study examines the share of the telecom players in the provision of wire line as well as wireless subscriptions in the telecom industry in March, 2012 with the use of Herfindahl Index.

TABLE-5 SELLER'S CONCENTRATION IN THE TELECOM INDUSTRY FIXED TELECOM SUBSCRIBERS IN MARCH, 2012

S.No.	Telecom company	Fixed Subscribers (in Absolute Numbers)	Market Share (in %)
1.	BSNL	22467732	69.84
2.	MTNL	3457729	10.75
3.	Bharti	3269949	10.16
4.	Tata	1441370	4.48
5.	Relance	1269750	3.95
6.	HFCL	200432	0.62
7.	Sistema	46659	0.15
8.	Vodafone	17850	0.06
	H.Index	0.51321	

Source- TRAI Report, 2012 [16]

In the above table, market share of different existing telecom companies in the provision of fixed cellular services have been shown and then herfindahl index is used to analyze the market concentration of these telecom companies in the Indian telecom industry. The herfindahl index that is obtained in the above table is greater than 0.25 (0.51) that clearly indicates high market concentration in the fixed service providers.

TABLE-6: SELLER'S CONCENTRATION FOR MOBILE SERVICES IN MARCH, 2012

S.No.	Telecom company	Mobile Subscribers (in Absolute Numbers)	Market Share (in %)
1.	Bharti	181279296	19.72
2.	Reliance	153045692	16.65
3.	Vodafone	150465330	16.37
4.	Idea	112722692	12.26
5.	BSNL	98512988	10.27
6.	Tata	81745797	8.89
7.	Aircel	62572579	6.81
8.	Uninor	42431924	4.62
9.	Sistema	15803039	1.72
10.	Videocon	5951588	0.65
11.	MTNL	5832398	0.63
12.	Loop	3267241	0.37
13.	Stel	3430288	0.36
14.	HFCL	1329910	0.14
15.	Etisalat	782291	0.09
	H. Index	0.13502	

Source – TRAI Report, 2012 [16]

Mobile telecom subscribers were stated for the year 2012 in the above table and their herfindahl index is below than 0.15 (0.135) which indicates the unconcentrated market concentration in the telecom market for the mobile service providers.

Thus it has been observed that telecom industry in fixed service indicates high market concentration as comparison to mobile service provider that show moderate concentration in the market. The reason behind that is the available number of service providers.

6.6 SELLER'S CONCENTRATION IN TELECOM INDUSTRY FOR (FIXED & MOBILE SERVICES) IN MARCH, 2017

Wire line and mobile services in the Indian telecom industry have been dominated by the public and private players respectively (TRAI, March 2017).

TABLE-7 SELLER'S CONCENTRATION FOR FIXED SERVICES IN MARCH, 2017

S.No	Telecom companies	Mobile subscribers inyear 2017 (in million)	Market Share (in%)
1	BSNL	13.21	0.55
2	Bharti	3.88	0.161
3	MTNL	3.44	0.143
4	Tata	1.84	0.076
5	Reliance	1.16	0.048
6	Quadrant	0.26	0.01
7	Vodafone	0.15	0.0062
8	Sistema	0.05	0.002
	Total	23.99	
	H. index	0.358	

Source- TRAI Report, 2017[17]

In the above table, market share of different existing telecom companies in the provision of fixed cellular services have been shown and then herfindahl index is used to analyze the market concentration of these telecom companies in the Indian telecom industry. The herfindahl index that is obtained in the above table is greater than 0.25 (0.35) that clearly indicates high market concentration in the fixed service providers.

TABLE-8 SELLER'S CONCENTRATION IN FOR MOBILE SERVICES IN MARCH, 2017

S.No	Telecom companies	Mobile subscribers inyear 2017 (in million)	Market Share (in%)
1	Bharti (GSM)	280.65	0.236
2	Vodafone (GSM)	211.94	0.178
3	Idea (GSM)	196.28	0.165
4	Reliance Jio (LTE)	123.36	0.103
5	BSNL (GSM)	103.43	0.087
6	Aircel (GSM)	90.32	0.076
7	Reliance (GSM)	81.33	0.068
8	Telenor (GSM)	47.33	0.039
9	Tata (GSM)	38.03	0.032
10	Tata (CDMA)	5.68	0.004
11	Sistema (CDMA)	4.13	0.003

12	MTNL (GSM)	3.63	0.003
13	BSNL (CDMA)	0.73	0.0006
	Total	1186.84	
	H.Index	0.146	

Source- TRAI Report, 2017 [17]

Mobile telecom subscribers were stated for the year 2017 in the above table and their herfindahl index was calculated that is obtained in the above table is 0.146 which indicates the unconcentrated market concentration in the telecom market for the mobile service providers for the year 2017.

7. MEASURES TO STRENGTHEN THE TELECOM INDUSTRY

For exploring the potential of economic growth in rural areas there is a need to improve the telecom services. For improving the telecom services, in these areas thrust should be given on development of telecom infrastructure. Measures should be encouraged for strengthening the signal system of the mobile towers in higher ridges & in the backward regions. Moreover telecom companies should focus on the availability of telecom services without a hectic and waiting procedure. For meeting the manpower requirement of telecom services specific skills need to be imparted to tap the available opportunities of further growth in the rural and urban India.

8. CONCLUSION: STRUCTURAL CHANGES IN TELECOM INDUSTRY

Pre-reform period (1971-1990)	Post reform period (1991-2013)
▪ Telecom industry was under the public telecom players of India. ▪ The establishment of public telecom players as DOT, MTNL and VSNL. ▪ Telecom industry was regulated with the establishment of Dot up to some extent. ▪ Existence of no specific telecom policy. ▪ State owned companies dominate the telecom industry. ▪ Technology development was low. ▪ No cellular service existed. ▪ Monopoly of state owned companies.	▪ Government of India opened the telecom industry for private investment in 1991. ▪ Existence of both public as well as private telecom players. ▪ TRAI was established in 1997 as a regulator in the telecom industry. ▪ Existence of telecom policy. ▪ First call on cellular mobile was done in 1995. ▪ Technological development up to greater extent with the introduction of GSM, CDMA, 2G, 3G and 4G services. ▪ Cellular service has been provided. ▪ Oligopolistic market structure in the telecom industry.

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