

Changing Structure, Performance, and Growth of Telecommunications in India

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Abstract

The growth performance of the Indian telecommunication services industry has been significantly high since the entry of private players in the sector. It is one of the few industries in India, which has traveled from being a monopolistic to an extremely competitive and dynamic industry. The present paper evaluated the changing structure of the telecom industry in India in terms of wireline vs. wireless, public vs. private, and GSM vs. CDMA. Growth of mobile telephony has been the most visible indicator of and catalyst for economic growth. The most encouraging feature has been the growth in the number of subscribers in rural areas, which is empowering the underprivileged sections of the society. A careful examination depicts that increase in urban teledensity is more rapid in comparison to rural teledensity. However, in case of landline telephones, the compound annual growth rate has been found to be negative because of extensive use of mobile technology in place of fixed lines. The results of analysis indicate that, on the one hand, wireless services have been dominated by few companies such as Bharti, Reliance, Vodafone, Idea, BSNL; whereas, on the other hand, wireline industry is being dominated by BSNL, MTNL, and Bharti, which implies that public sector entities are still leading wireline services. In case of Internet service providers, BSNL is the leading Internet service provider followed by Reliance Communication Infrastructure Ltd., MTNL, and Bharti. Further, the Indian telecom sector has witnessed major changes in the tariff structure resulting in lower prices.

Keywords : telecommunications, market share, Internet services, wireline, wireless technology

JEL Classification : L96, L19, L86, L63

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India has become one of the fastest growing economies in the world over the last two decades. One of the significant aspects of India's recent growth has been the dynamism of the service sector, particularly information technology (IT) and IT enabled services (ITES). The contribution of the service sector has been increasing since 1990s due to adoption of liberalization, privatization, and globalization policy in India. This growth trajectory has been termed as 'services-led' industrialization or 'services revolution' (Singh, 2006). Within the services sector, the telecom sector has been the major contributor to India's growth due to its capacity to offer communication, entertainment, information, and other services. The Indian telecommunication network is the third largest in the world and the second largest among the emerging economies of Asia.

The pace of growth of the telecom sector, particularly the telecom services has increased its significance for the overall economy in the past two decades. This rapid growth has been possible due to various proactive and positive decisions of the government and contribution of both the public and the private sector. The rapid strides in the telecom sector have been facilitated by liberal policies of the government that provide easy market access for telecom equipment and a fair regulatory framework for offering telecom services to the Indian consumers at affordable prices (Kumar & Jain, 2010).

The Section 1 identifies the structure and six dimensions of the growth performance of the telecom sector in

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India. The Section 2 focuses on the trends in growth of teledensity, direct exchange lines (DELs), total telephones during pre-reform, reform, and post reform period. It also includes the growth of Internet subscribers in India.

Section 1

Among the infrastructure industries, telecommunications is the only industry that has shown significant improvements during the reforms period. Consequently, it is generally opined that a revolution of sorts is taking place in the Indian telecommunication industry. Six dimensions of this growth performance have been discussed as under (see Figure 1(a)).

Dimensions of the Growth Performance of Telecommunication Services

(1) Wireline vs. Wireless : In the initial years of mobile telephony, the growth in the number of subscribers was very low, with average monthly subscriber additions in the range of 0.05 - 0.1 million subscribers. The advent of the National Telecom Policy 1999 paved the way for rapid growth in the wireless subscriber base. The Indian telecom sector is now heavily dominated by wireless technologies which include cellular mobile and fixed wireless technologies. Cellular or mobile segment has been the key contributor to record growth in telephone subscriptions with its wide range of offers of services. It has led to the growth wave of telecom sector in the country. More than 95% of wireless connections are prepaid. GSM mobile system is pre-dominant in India. GSM accounted for 87.9% of the wireless subscriptions as in March 2012. Wireline subscriptions increased from 2.3 million in 1981 to 32.44 million in 2000 to reach its peak at 50.18 million in 2006 (Department of Telecommunications, 2012).

Thereafter, it started registering negative growth. By the end of February 2012, wireline subscriptions came down to 32.33 million. India has followed the worldwide trend where the mobile phone is a substitute to fixed line phone, though competition has forced landline services to become more efficient in terms of quality of services. The landline network quality has improved and landline connections are now usually available on demand (Telecom Regulatory Authority of India [TRAI], 2012). Although, fixed line operators are trying to offer value

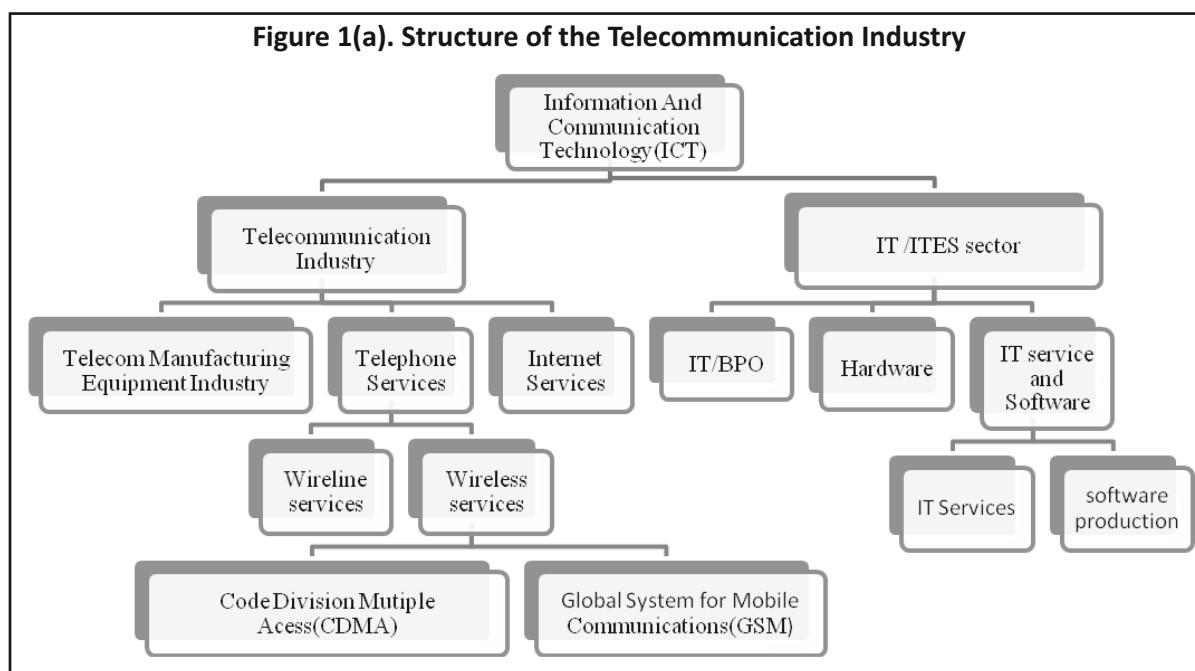
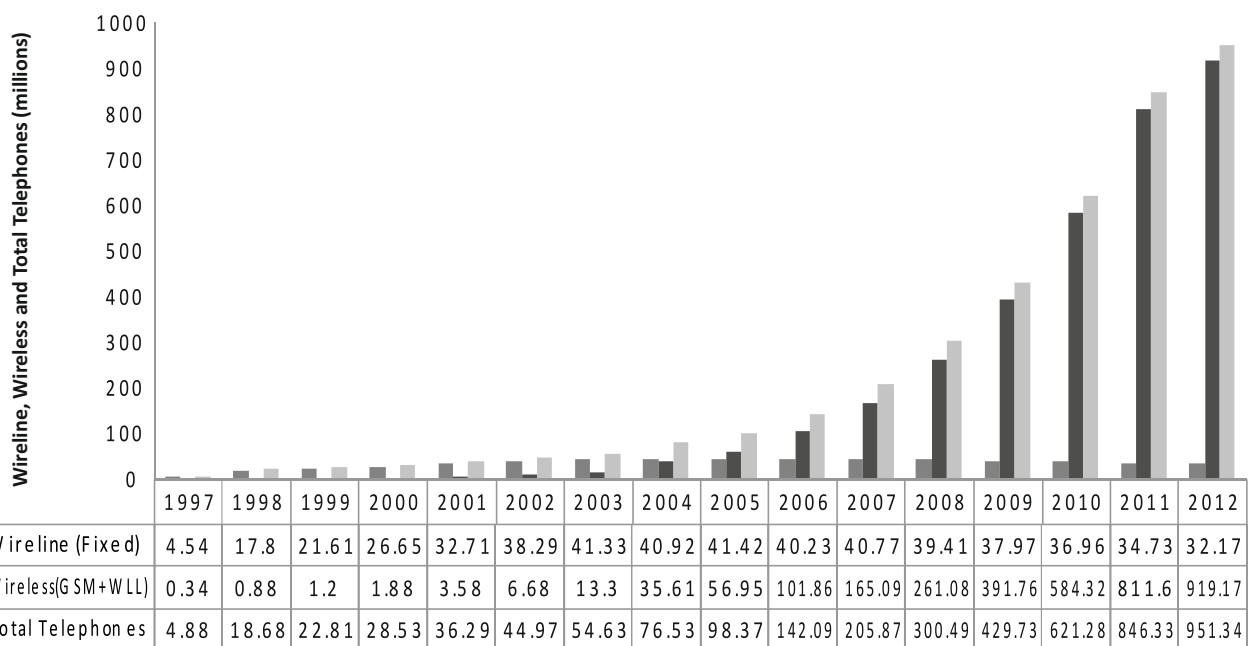


Figure 1. Wireline and Wireless (GSM+WLL) Telephones and Total Telephone (in millions)



Source: Department of Telecommunications. (Various Years). Annual Reports (various issues). New Delhi : Government of India

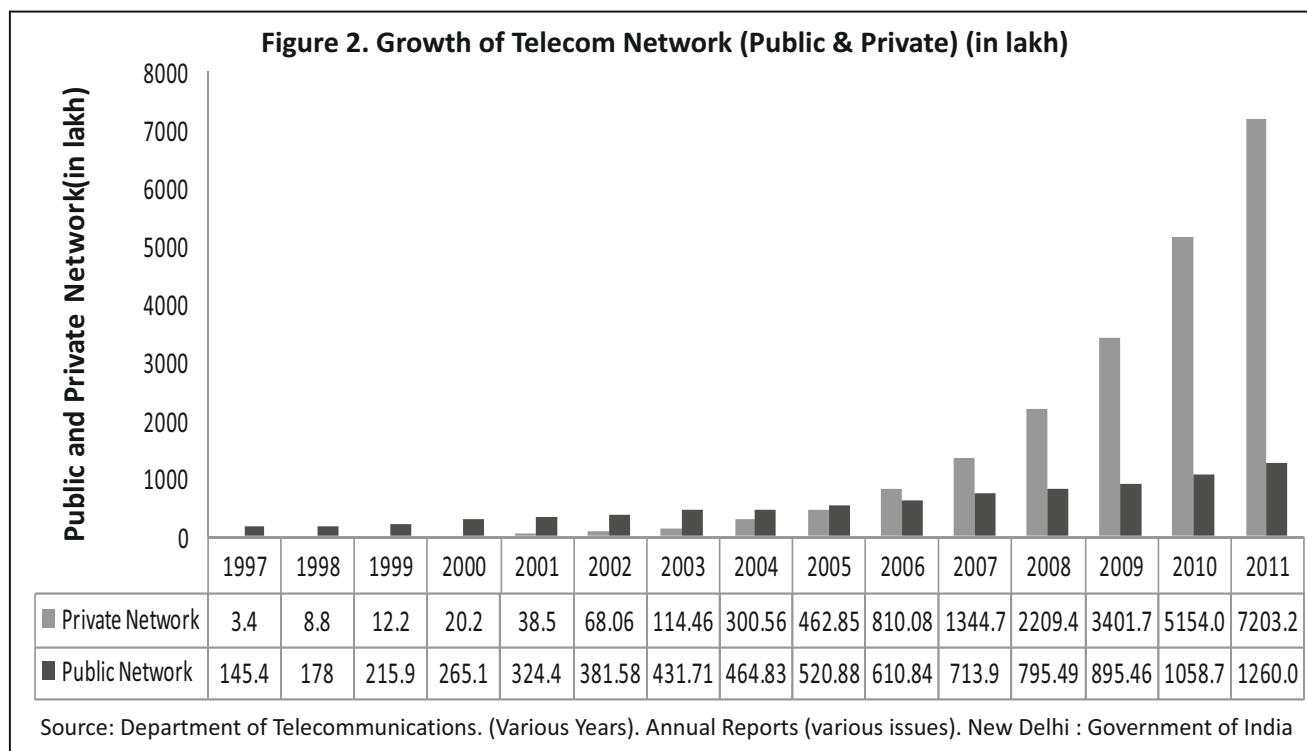
added services such as high speed Internet access, video on demand and video-conferencing, but wireline technologies continue to face stiff competition from wireless services (Ernst & Young, 2011).

The growth of wireless services has been substantial. The share of wireless phones increased from 80.19% in 2007 to 96.72% in 2012. On the other hand, the share of wireline phones has steadily declined from 19.81% in 2007 to 3.44% in 2012. Wireless phones have increased as they are preferred because of their convenience and affordability. As a result, telephones today have come within the reach of the common man (Department of Telecommunications, 2012).

The Figure 1 shows the wireline, wireless (GSM+WLL), and total subscribers over the period from 1991-2012. Data shows that wireline subscribers increased from 4.54 million to 32.17 million during the period from 1997-2012. However, wireless subscribers grew at a much faster pace comparatively and increased to 919.17 million in 2012 from just 0.34 million in 1997 as shown in the Figure 1.

(2) Growth of Telecom Network - Private vs. Public : The fruits of liberalization efforts of the government are evident in growing the share of the private sector. It is evident from the Figure 2 that the private telecom network increased rapidly from 3.4 lakh subscribers to 7203.2 lakh subscribers, but the public network increased at a slower pace, from 145.4 lakh subscribers to 1260.0 lakh subscribers during 1997-2012. The Figure 2 depicts that the growth of the private sector telecom network has been much faster since 2002-03 as compared to the growth of the public sector telecom network (Department of Telecommunications, 2011-12).

(3) GSM Vs. CDMA : The telecom industry has become very competitive. There is a competition between two standards or technologies, namely Global System for Mobile Communications (GSM) and Code Division Multiple Access (CDMA) standards. The history of the mobile services industry can be traced to 1997 when GSM cellular services were started. CDMA was introduced in the end of 2002. Till 2002, Indian mobile operators deployed GSM only. In 2002, the government permitted basic operators to offer limited mobility using the



CDMA technology (Mani, 2008a). GSM started with plain voice calls, but now, it has a powerful platform capable of supporting mobile broadband and multimedia services.

The CDMA technology operates in a relatively small amount of spectrum. CDMA was basically designed for providing Internet services in mobiles. It is an efficient and reliable IP-based platform on which wireless data applications are delivered. CDMA supports thousands of applications across multiple execution environments (e.g. Java, Linux, Palm, RIM, Windows Mobile, etc.) and customers can choose from a wide variety of handsets, fixed wireless phones, smart phones, notebooks, desktop modems, and PC cards to access these applications. One of the most important institutional requirements for competition to emerge and sustain is the introduction of mobile number portability in 2011 that allows a customer to move from one mobile service to another within GSM, and also between GSM and CDMA, while retaining the same number (TRAI, 2012). The Table 1 shows subscriber base of GSM and CDMA operators. It can be observed from the Table 1 that the subscriber base of GSM operators is much higher as compared to that of CDMA operators.

Table 1. Subscriber-Base of Wireless Operators (GSM & CDMA) as on March 31, 2012 (in millions)

Year	GSM (%share)	CDMA(%share)	Total
2005	50.86(78.16)	14.21(21.83)	65.07
2007	120.47(72.96)	44.64(27.03)	165.11
2008	192.70(73.83)	68.37(26.16)	261.07
2009	297.26(75.87)	94.50(24.12)	391.76
2010	478.68(81.92)	105.64(18.07)	584.32
2011	698.37(86.04)	113.22(14.96)	811.59
2012	814.06(76.27)	105.11(23.72)	919.17

Source: Telecom Regulatory Authority of India (Various Years). Annual Report (Various Issues). Government of India, New Delhi.

Table 2. Operator Wise Fixed (Wireline) Subscriber Base During 2003-2012 (in millions)

Service Provider (Wireline)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	CAGR% Period(2003-12)
BSNL	35.71	36.49	36.76	33.58	31.71	29.5	28.10	25.65	23.00	21.04	-5.47
MTNL	4.46	4.08	3.86	3.69	3.60	3.53	3.49	3.47	3.45	3.46	-2.50
Reliance	0.29	1.18	2.57	0.78	2.18	1.07	1.16	1.22	1.27	1.26	6.42
Tata	0.87	2	4.04	0.48	0.78	0.87	1.10	1.27	1.40	1.44	-1.60
Bharti	0.57	0.80	1.20	1.74	0.67	2.61	2.99	3.26	3.32	3.28	21.55
HFCL	0.1	0.18	0.24	0.17	0.15	0.16	0.17	0.19	0.20	0.18	-1.20
Sistema	0.07	0.13	0.17	0.15	0.16	0.16	0.05	0.04	0.05	0.05	-1.25
Total	42.09	44.87	48.84	40.30	39.25	37.90	37.06	35.09	32.69	30.79	-3.87

Source : Telecom Regulatory Authority of India. (Various Years). The Indian telecom services performance indicators (Various Issues). New Delhi : Government of India

(4) Operator Wise Wireline and Wireless Subscriber Base : The Table 2 shows that BSNL has the highest subscriber base followed by MTNL and Bharti. It also shows that Bharti is a leading private sector player in the telecom industry with the highest compound annual growth rate (CAGR) of 21.55 % followed by Reliance (6.42 %). The companies with negative growth rates include BSNL (-5.47%), HFCL (-1.20%), MTNL (-2.50%), and Tata (-1.60%). The Table 3 shows the compound annual growth rate over a period in which the companies had entered into the market.

The Table 3 shows that the largest telecom service provider company in India is Bharti, which had 181.2 million subscribers in 2012. The second largest company is Reliance with 153 million subscribers in 2012 followed by Vodafone (150.4 million) and Idea (112.7 million). The Table 3 depicts that the public sector company BSNL had 98.5 million subscribers in 2012 and MTNL had 5.83 million subscribers during the same period. Furthermore, it is evident from the data shown in the Table 3 that all the top private companies had grown annually at a rate between 59% to 70%, indicating very fast growth of telecom sector during this period. BSNL also grew at a rate of 49.8% and MTNL grew at a rate of 37.8% during the same period. Hence, the Indian telecom sector is dominated by private sector companies such as Bharti, Reliance, Vodafone, Idea, Tata, and Aircel. Apart from these, there are smaller companies like Unitech, Sistema, Videocon, HFCL, and so forth, which provide services in few regions/states. Among the public sector companies, BSNL is the major service provider all over India, while MTNL provides services in Mumbai and Delhi.

The Figure 3 shows the market shares of wireless service providers in 2003. The Figure 3 depicts that Bharti (25%) was the leading player with the highest share in providing telecom services during the period followed by BSNL (22%), Hutchison (17%), Idea (10%), and BPL (7%). On the other hand, MTNL (1%) had the lowest share in providing wireless services followed by Reliance (3%), Escotel (4%), and Spice (5%).

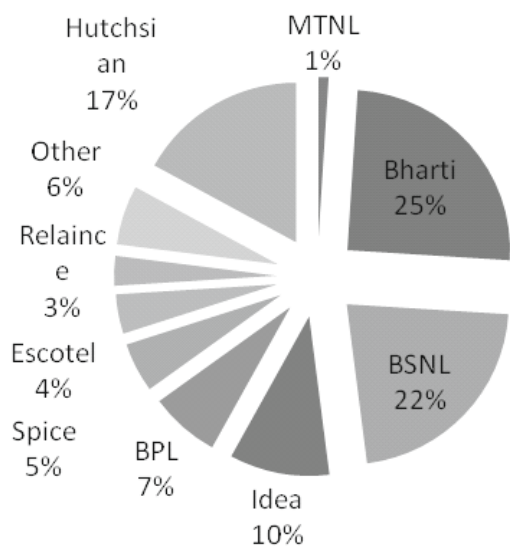
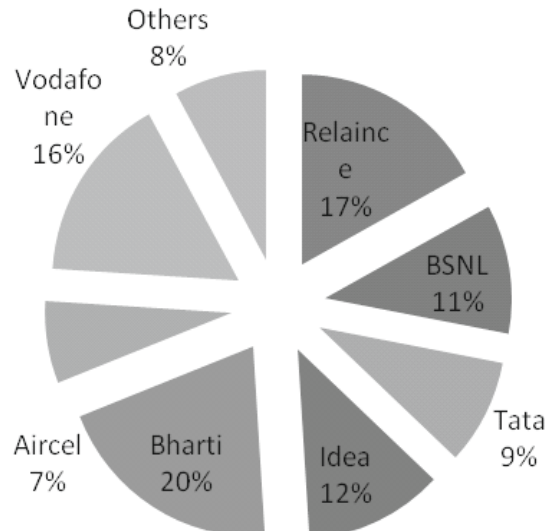
The Figure 4 shows the market share of wireless service providers in 2012. Data reveals that Bharti (20%) had the highest share in providing wireless services followed by Reliance (17%), Vodafone (16%), Idea (12%), BSNL (11%), and Tata (9%). It is important to note here that Hutchison has been acquired by Vodafone and Spice was also acquired by Idea.

The Figure 5 shows that the market share of BSNL (84.80%) was the highest in providing wireline services in 2003 followed by that of MTNL (10.6%) and of private operators (4.60%). The Figure 6 shows that BSNL (70%) had the highest market share among the wireline service providers followed by MTNL (11%), Bharti (10%), Tata (4%), and Reliance (4%) during 2012. It can be observed from the Figures 5 and 6 that competition among the wireline service providers is not very strong, rather BSNL is the only major player in the wireline market. The analysis shows that public sector companies, that is, BSNL and MTNL continue to be the leaders of wireline segment, but private operators such as Bharti, Reliance, and Tata are consolidating their position in this segment.

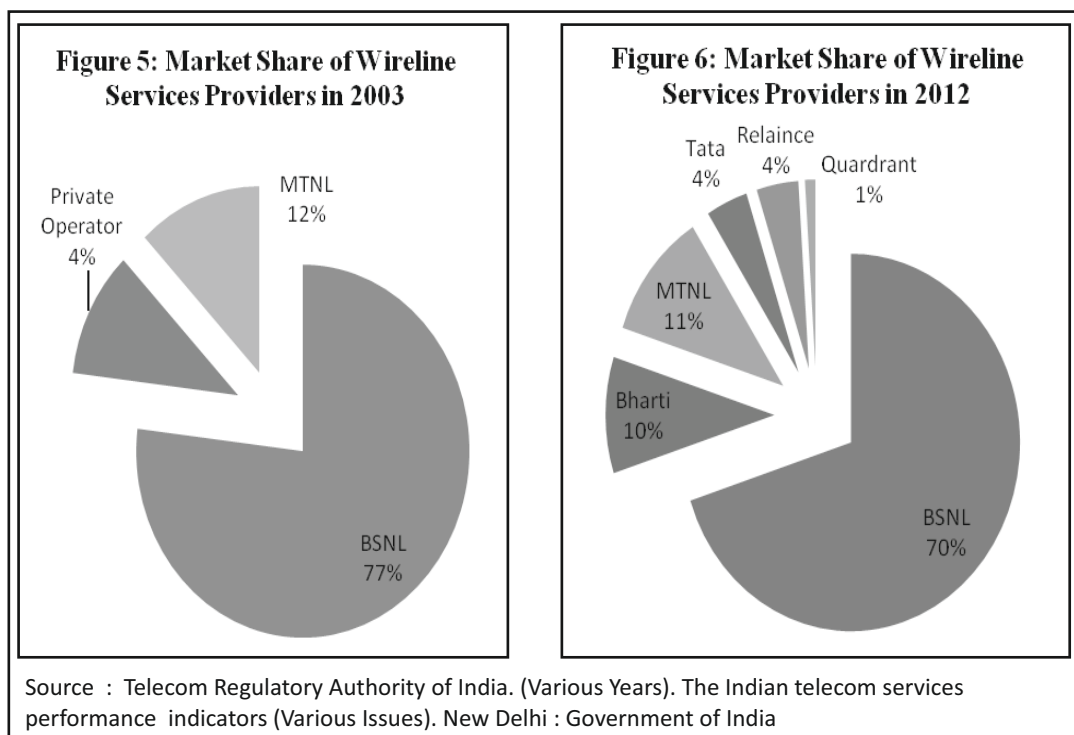
Table 3. Operator Wise Wireless Subscriber Base During 2003-2012(in millions)

Service provider	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	CAGR% (2003-12)
Bharti	3.07	6.5	10.98	19.58	37.14	61.98	93.92	127.62	162.2	181.28	59.18
Reliance	0.54	7.26	10.45	17.31	28.01	45.79	72.67	102.42	135.72	153.05	69.97
Vodafone	2.16	5.15	7.8	15.36	26.44	44.13	68.77	100.86	134.57	150.47	59.63
Idea	1.28	2.73	5.07	7.37	14.01	24	38.89	63.82	89.5	112.72	65.29
Spice	0.64	1.21	1.44	1.93	2.73	4.21	4.13	-	-	-	36.57
BSNL	2.29	5.53	9.9	17.65	30.99	40.79	52.15	69.45	91.83	98.51	49.83
Tata	0.16	0.63	1.09	4.85	16.02	24.33	35.12	65.94	89.14	81.75	104.03
Aircel	0.73	1.29	1.76	2.16	5.51	10.61	18.48	36.86	54.84	62.57	71.26
Unitech	-	-	-	-	-	-	0	4.26	22.79	42.43	215.41
Sistema	-	-	-	-	0.1	0.11	0.6	3.78	10.06	15.68	219.67
Videocon	-	-	-	-	-	-	0	0.03	7.11	5.95	1294
MTNL	0.35	0.46	1.08	2.05	2.94	3.53	4.48	5.09	5.47	5.83	37.81
S tel	-	-	-	-	-	-	0	1.01	2.82	3.43	84.28
Loop	-	-	-	-	1.07	1.29	2.16	2.84	3.09	3.27	27.76
HFCL	0.03	0.03	0.03	0.03	0.15	0.3	0.39	0.33	1.47	1.33	59.57
Etisalat	-	-	-	-	-	-	0	0.0004	0.97	0.78	129.6
Total	13	33.69	52.23	90.14	165.11	261.07	391.76	584.32	811.59	919.17	59.98

Source : Telecom Regulatory Authority of India. (Various Years). The Indian telecom services performance indicators (Various Issues). New Delhi : Government of India

Figure 3: Market Share of Wireless Service Providers in 2003**Figure 4: Market Share of Wireless Service Providers in 2012**

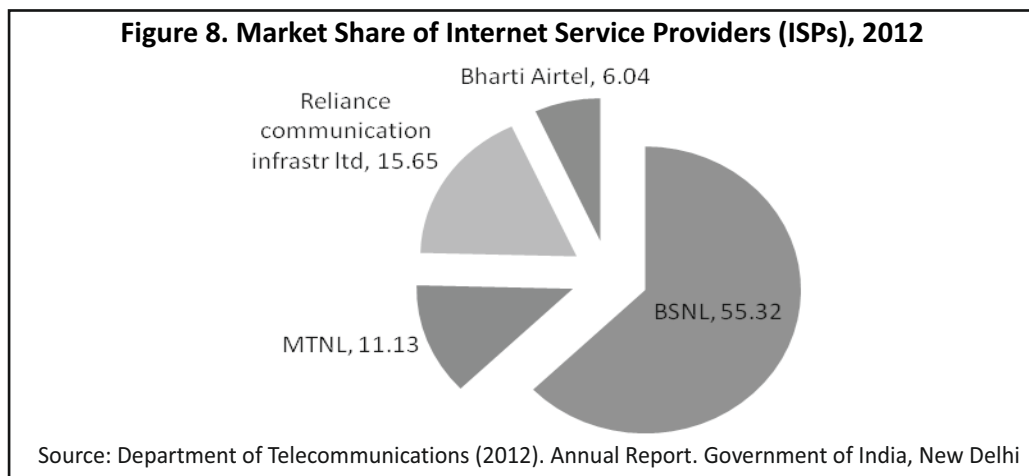
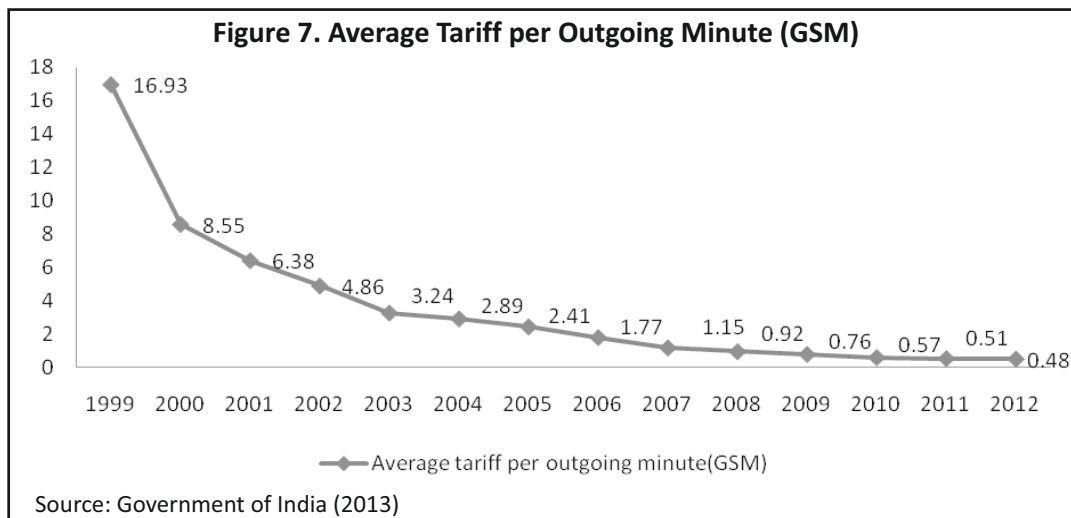
Source : Telecom Regulatory Authority of India. (Various Years). The Indian telecom services performance indicators (Various Issues). New Delhi : Government of India



(5) Changing Trends in Prices of Telecom Services : The Indian Telecom Sector has witnessed major changes in the tariff structure. One of the direct effects of competition is lower prices. Recent years have witnessed sharp decline in tariffs in India, particularly in the mobile, national long distance, and international long distance segments. For example, a local mobile call which used to cost ₹ 15 per minute in the pre-1999 period, now costs 60 paise per minute. Similarly, domestic long distance calls which used to cost more than ₹ 37 per minute in the pre-1999 period are now available virtually at the cost of local calls. In case of international long distance calls, for example, a call to the American continent from India has come down from ₹ 75 to less than ₹ 7 per minute (Department of Telecommunications, 2012). While the consumer has benefited from the mobile revolution, operators are facing a tough challenge of declining average revenue per user (ARPU). The declining ARPU is mainly the result of declining call rates, thus enhancing affordability of consumers from the lower income strata. Profit margins have declined for both public and private sectors, and the decline is higher for the public sector (TRAI, 2012).

The Figure 7 shows average tariff per outgoing minute of GSM technology. It reveals a consistent decline in tariff rates from ₹ 16.93 in 1999 to ₹ 0.48 in 2012. Therefore, the industry is characterized by low average tariff per outgoing call and high subscriber base.

(6) Market Share in Internet Telephony : The Internet has overturned the lifestyle of many Indians by creating a new means of communication, knowledge sharing, governance, employment, and the delivery of services. Internet services were launched in India on August 15, 1995. In November 1998, the government opened up the sector to private operators. A liberal licensing regime was permitted by the government to increase Internet penetration across the country. Further, the evolution of technology and increase in bandwidth has given rise to Internet connections at a faster pace than the traditional dial - up connections. The Department of Telecommunications formulated the Broadband Policy 2004, which envisions promoting Internet penetration through various access technologies such as optical fiber, digital subscriber lines (DSL) on copper loop, cable television networks, satellite media, terrestrial wireless, and future technologies (Ernst & Young, 2011).



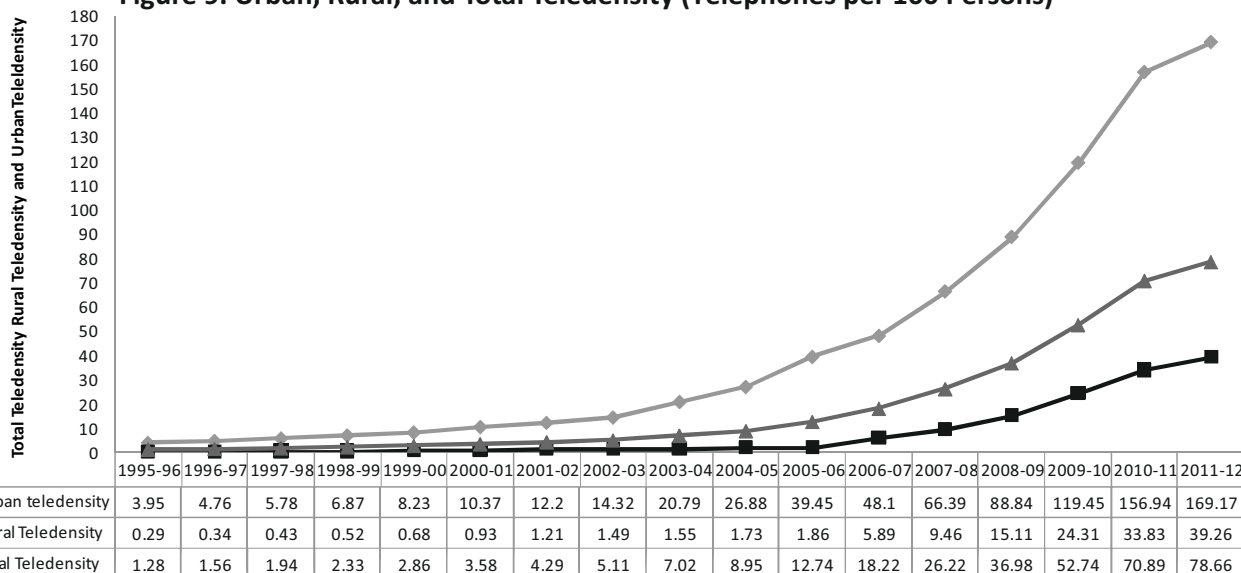
As per the new guidelines for grant of license for operating Internet services issued by Department of Telecommunications in August 2007, all Internet service providers were permitted to provide Internet telephony and a separate category of Internet telephony service providers (ITSPs) has been done away with. The Figure 8 shows market share of Internet service providers in 2012 where BSNL is the leading Internet service provider followed by Reliance Communication Infrastructure Ltd. (15%), MTNL (11.13%), and Bharti (6.06%).

Section 2

While the teledensity in India has improved substantially, there is a stark difference in the teledensity of urban and rural areas. Urban teledensity has improved substantially. While the teledensity in metros is rapidly reaching a saturation point, the future growth in urban areas is expected to come from non-metros. The teledensity of rural areas has also improved substantially during the last decade.

(1) Trends in Growth of Urban, Rural, and Total Teledensity : The teledensity witnessed a significant increase from just above 1.28 in 1995-06 to 78.66 in 2011-12. Even though the teledensity has improved substantially during the last decade, it is still low as compared to that of China. Thus, there is a huge untapped potential existing for telecom operators in India. In fact, the significant improvement in rural teledensity has been primarily backed

Figure 9. Urban, Rural, and Total Teledensity (Telephones per 100 Persons)



Source: Department of Telecommunications (Various Years). Annual Report (Various Issues) Government of India, New Delhi.

by the surge in wireless services in rural areas. When looking at total teledensity (fixed and mobile connections), we observe that the gap between urban and rural teledensity has increased steadily. The benefits of telecommunications growth seems to be mainly captured by wealthier and urban customers.

The Figure 9 shows a consistent increase in urban and rural teledensity, and consequently, total teledensity. During the period from 1995-96 to 2011-12, urban teledensity increased largely from 3.95 to 169.17. It is evident from the Figure 9 that rural teledensity increased from 0.29 to 39.26 during the same period and total teledensity grew from 1.28 to 78.66 during the same period. A careful examination shows that the increase in urban teledensity has been more rapid as compared to rural teledensity. Low teledensity in rural areas may be attributed to various factors such as lack of infrastructure and connectivity because of lack of telephone towers and low income levels of rural people.

(2) Growth of Teledensity, Direct Exchange Lines (DELs), Total Telephones During Pre-Reform, Reform, and Post Reform Period : The Table 4 provides the compound annual growth rates (CAGR) of teledensity, direct exchange lines (DELs), and total telephones during the pre-reform period, reform period, and post-reform period. The Figures 10, 11, and 12 show that the CAGR for teledensity was 6.34% during 1981-90 followed by the DELs (9.12%), and total telephones (9.12%) during the same period. The higher values of CAGR for telecom indicators indicate improvement in telecom infrastructure development during the pre-reform period.

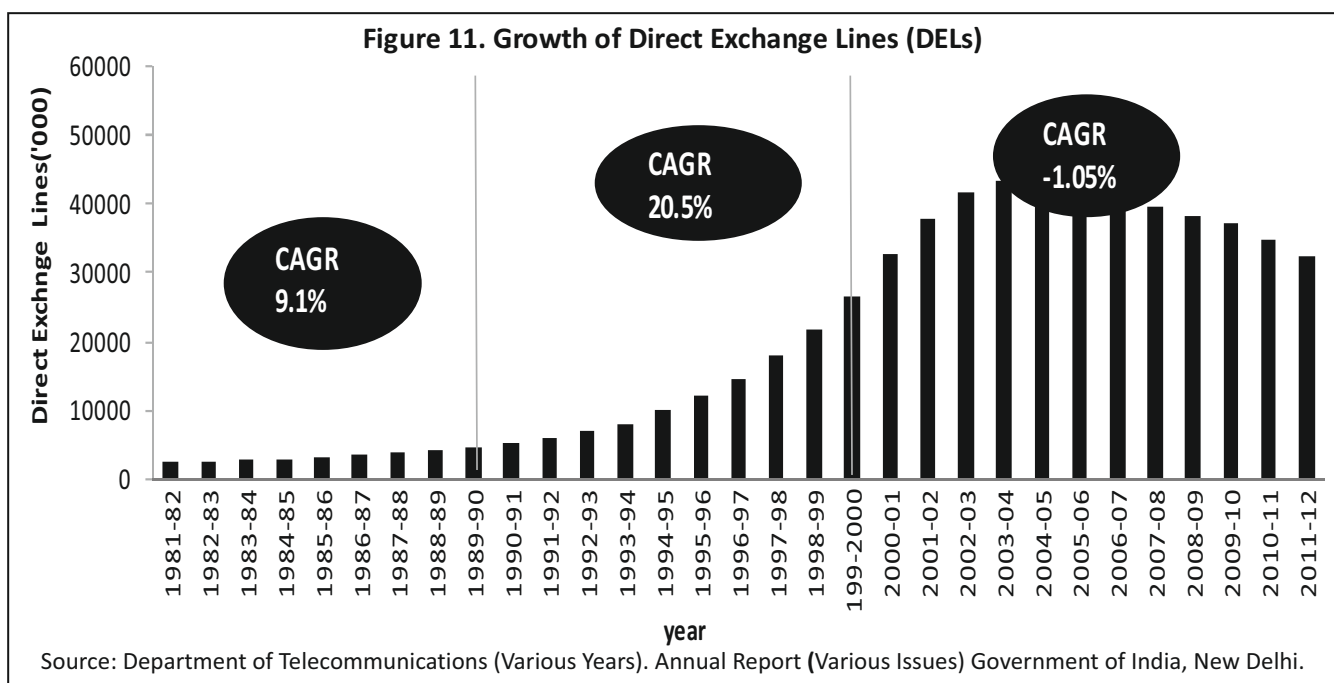
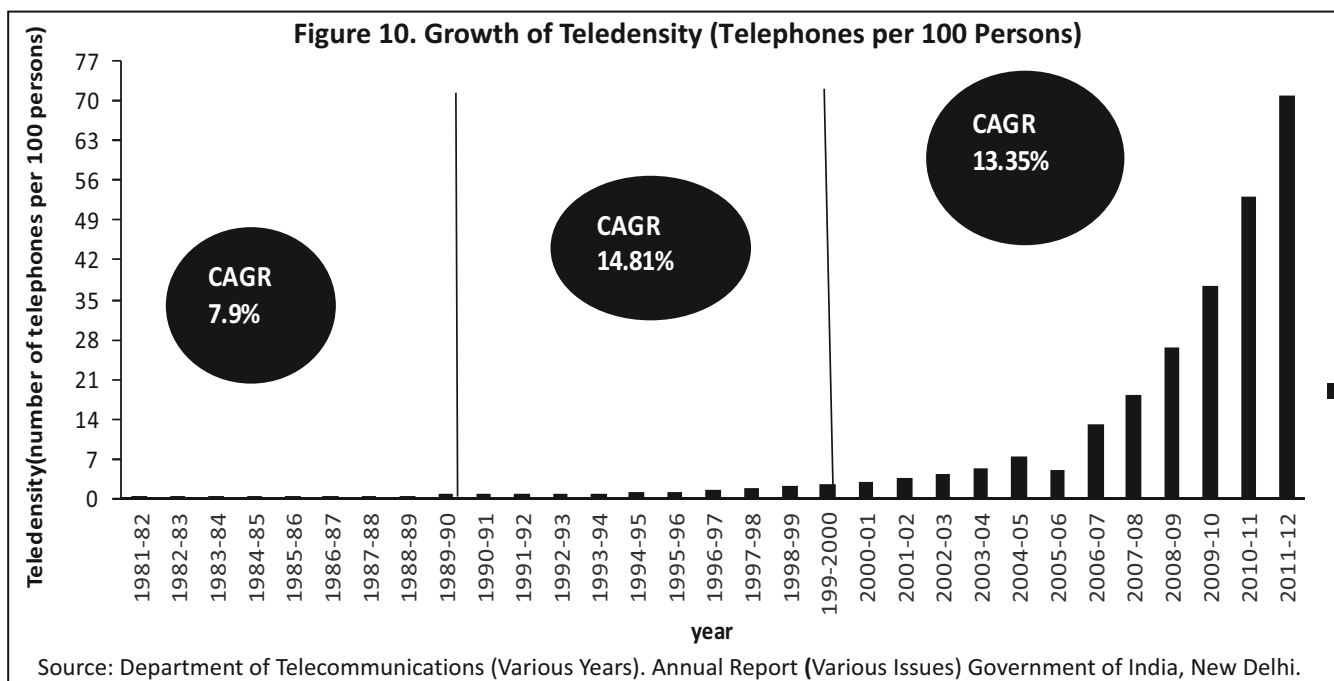
The Table 4 also shows the results of CAGR during the liberalization period. The results revealed that due to various policy measures during this period, there is marked improvement in the values of CAGR. The CAGR of tele-density, DELs and total telephones increased to 17.60%, 20.57%, and 21.54%, respectively during 1991-2000 as shown in Figures 10, 11, and 12. Various factors responsible for this remarkable improvement in the telecom services include introduction of policy measures like National Telecom Policy 1994 as well as 1999, Establishment of TRAI (1997), introduction of mobile telephony, and de-licensing of telecom equipment manufacturing. During the post-liberalization period, that is, from 2001- 2012, the compound annual growth rates of tele-density, DELs, and total telephones were 19.98%, -1.05%, and 38.59% , respectively as indicated by Figures 10, 11, and 12. The values of CAGR showed improvement over the previous years in case of total

telephones. However, in case of DELs, CAGR was found to be negative because of extensive use of mobile technology in place of DELs.

Table 4. Growth Rate of Teledensity, Direct Exchange Lines, and Total Telephones During 1980-1990, 1990-2000, and 2000 - 2012

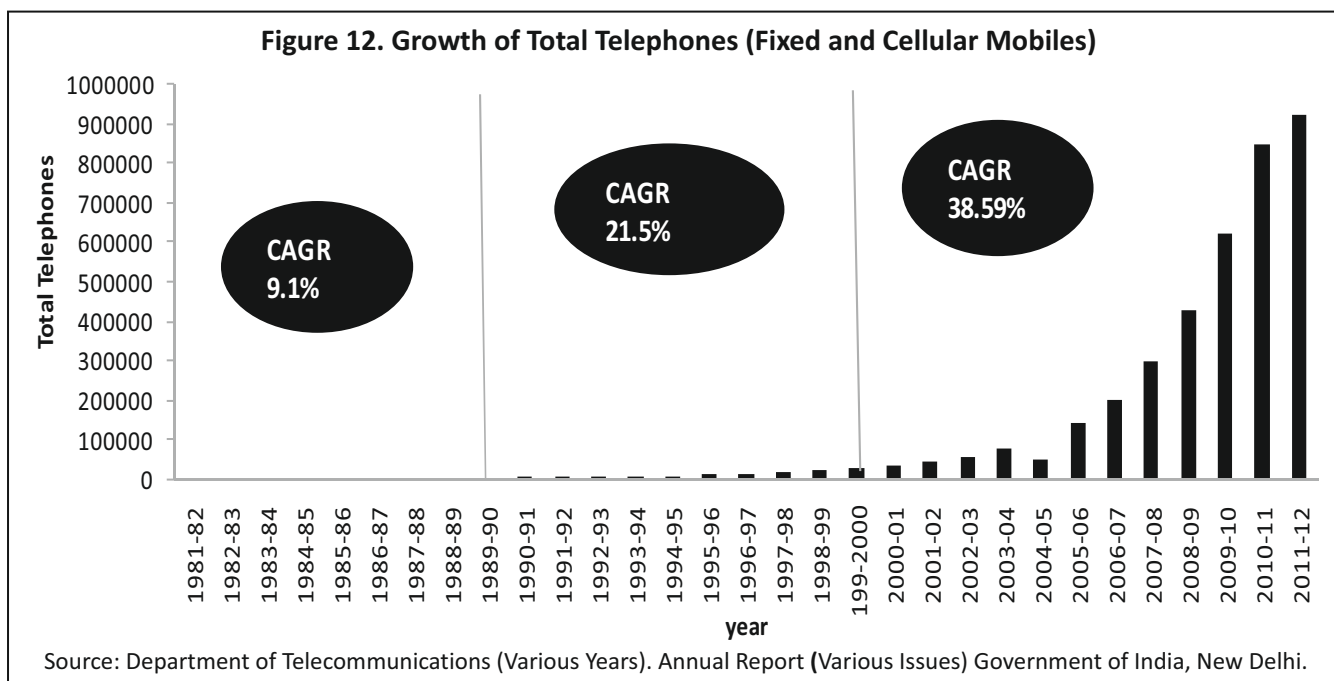
Year	Teledensity persons(per 100),	Direct Exchange Lines ('000)	Total Telephones('000)
1981-82	0.33	2296.0	2296
1982-83	0.35	2465.3	2465.3
1983-84	0.37	2666.8	2666.8
1984-85	0.39	2897.8	2897.8
1985-86	0.42	3165.8	3165.8
1986-87	0.45	3486.4	3486.4
1987-88	0.48	3800.8	3800.8
1988-89	0.52	4166.5	4166.5
1989-90	0.56	4589.5	4589.5
1990-91	0.60	5074.7	5074.7
1991-92	0.68	5809.9	5809.9
1992-93	0.78	6796.7	6796.7
1993-94	0.90	8025.6	8025.6
1994-95	1.08	9795.3	9795.3
1995-96	1.29	11978.3	11978.3
1996-97	1.57	14542.7	14881.7
1997-98	1.94	17801	18683.3
1998-99	2.32	21593.7	22789.1
1999-00	2.84	26510.0	28394.3
2000-01	3.53	32434.8	36011.9
2001-02	4.26	37868.80	44299.6
2002-03	5.25	41571.0	55429.6
2003-04	7.23	43273.6	77541.2
2004-05	4.80	46162.4	52266.2
2005-06	12.80	50545.0	141519.7
2006-07	18.01	40777.7	202040.8
2007-08	26.41	39416.0	300493.3
2008-09	37.24	37964.6	429725.2
2009-10	53.10	36956.7	621280.10
2010-11	70.89	34729.84	846328.16
2011-12	78.66	32171.47	951346.00
CAGR %(1981-90)	6.35	9.122	9.122
CAGR%(1991-00)	17.60	20.57	21.54
CAGR %(2001-12)	19.98	-1.05	38.59

Source: Economic Intelligence Service. (Various Years). CMIE Report : Infrastructure (various issues). Mumbai.



(3) Growth of Internet Users (per 100 Persons) : The Internet is growing rapidly in India since its introduction, but primarily, the usage of the Internet is restricted to “fixed” points like homes, offices, and cyber cafés. Internet usage can be facilitated by high speed data cards, public Wi-Fi hot spots, and Internet access on mobile phones. Over the years, other access points such as Wi-Fi hot spots and Internet access on mobile phones are gaining popularity and user acceptance due to better convenience and mobility.

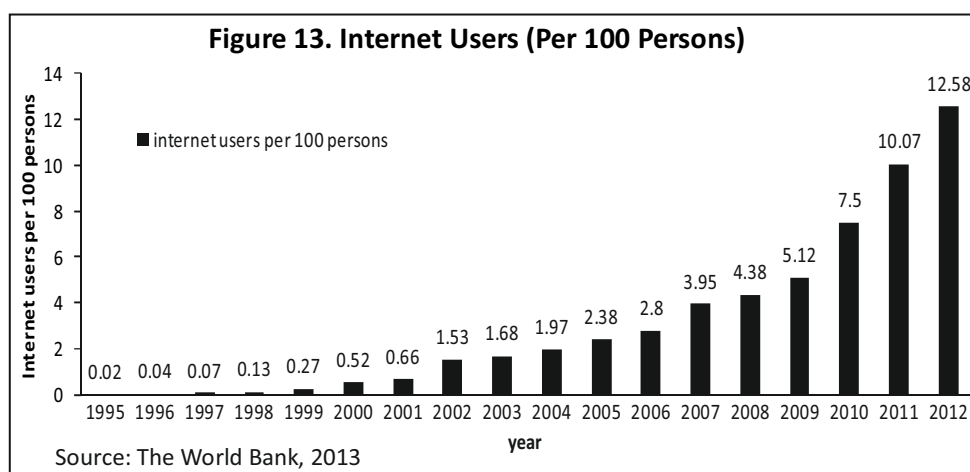
Data card and Internet access on mobile phones has shown considerable increase in India. This growth is



attributed to the variety of online applications such as online communication, information search, user generated content as well as online entertainment applications like gaming. Furthermore, with increasing notebook/laptop penetration in homes as well as businesses, the data card (mobile dongles that can be attached to laptops) market has also increased significantly. The Figure 13 shows a consistent increase in number of Internet users (per 100 persons) during the period from 1995-2012.

Policy Implications and Conclusion

(1) The telecom sector has grown by leaps and bounds since liberalization of the economy and will continue to do so. The policy focus of the government should be to maximize the spillovers of this activity to local Indian companies such as components and semiconductor manufacturing. This sector can play an immense role in employment generation, export of IT/ITES products and services, and growth of all the sectors of the economy.



Now, the objective should be to raise the competitiveness of the Indian telecom sector so as to make it a world leader. Rapid technological advancements are taking place in this sector and there is a need to make viable use of such advancements to streamline the slow growth of broadband penetration and usage in rural and far flung areas.

(2) Access to telecommunication is crucial for achieving the social and economic goals and will help in addressing the developmental challenges of the country. This requires a concerted effort on the part of the government as well as affordable and effective communication networks for citizens and special provisions for the poor.

(3) India has achieved a lot in the telecom sector in terms of accessibility and connectivity throughout the country. However, lack of quality healthcare and education and non-availability of banking to masses have been major hurdles in achieving inclusive growth of the country. Here, the telecom sector has a great role to play.

(4) The Indian telecom sector is dominated by the private sector and voice telephony services. There is a need to make mobile users aware of how to make use of data services using 3G/broadband wireless services. The growth of the economy is highly dependent on data services as opposed to voice telephony. Therefore, a significant challenge remains in making the Indian telecom infrastructure accessible and responsive to this basic requirement.

(5) The telecommunications services industry is one of the most successful cases of liberalization in India. Adoption of liberalization has opened up the telecom sector to private sector participation which was earlier under the monopoly of the government. The telecom sector which grew largely in the recent past has also helped other sectors grow through diffusion of information and ideas. The results of analysis are in consonance with the earlier studies conducted by Mani (2008a, 2008b). Nowadays, a modern telecommunication infrastructural development is essential for development of various services including finance, insurance, banking, real estate, hotel, tourism, restaurant services, and so forth. Regulatory and institutional reforms in the telecom sector have resulted in reduction of the cost of transportation, faster information exchange, and protection of consumer interests. Reforms have resulted in improved access to telephones, first in urban areas, but increasingly in rural areas as well. Reforms have also increased the demand for telecom equipments on a scale unprecedented in the history of this industry.

Limitations of the Study and Scope for Further Research

The study is based on secondary data, and hence, its findings are subject to accuracy of data given in reports. However, the study has used most reliable data sources for the purpose. The study can be further extended at the state level so as to figure out the factors responsible for inter-state as well as rural-urban differences in telecom growth, taking into account teledensity and other indicators of telecom growth across India.

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