Research Paper

Trend And Inequality in Telecommunication Development in India

Economics

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ABSTRACT — *The paper captures the trend in tele-density of India over the period 2000-2014 covering 17 states and 1 Union Territory (UT). Attempts have also been made to measure the inequality trend in tele-density across the states/UT during this period. It has been observed that there has been a substantial improvement in tele-density of India since 2008. The compound growth rate figures of the states/UT computed for the period showed that the states of Jammu & Kashmir, Bihar, Assam, Uttar Pradesh and Orissa were the first five fastest growing states. Splitting the entire data period into three sub-periods 2000-2005, 2005-2010 and 2010-2014 revealed on analysis, that growth rates of the states/UT had been remarkably large during 2005-2010 compared to the periods 2000-2005 and 2010-2014. Inequality measures point to a fall in inequality across the states/UT during the study period.*

Introduction

Telecommunication is considered as a key infrastructure of the modern era. The growth of Information Technology in India requires the growth of this sector as a support system. In this knowledge intensive world the importance of this sector cannot be overemphasized. In India telecommunication network is the second largest after China. By the end of March 2014, the country reached a figure of 933.02 million telephone connections across the nation with an overall tele-density of 75.23%. The contribution of wireless telephone connections in these figures has been predominant - its share in the total telephone connections being 96.95%. Prior to 1985, the development of this sector was largely neglected by the Indian Government. It was only in the beginning of the seventh plan in 1985 that the potential of this sector was realized by the Government, in terms of its direct spillover effects on all the other sectors of the economy. The result was the constitution of the Department of Telecommunications (DoT), to monitor, oversee and to develop telecom services in India. DoT was also given the authority to grant licenses to the potential telecom service operators of the country for providing basic and value added services. Thereafter in 1986, two entities – MTNL and VSNL were established. While the objective of MTNL was to provide local services in Delhi and Mumbai, that of VSNL was to handle the international circles. The Indian telecom market thus had a monopoly structure with three bodies taking care of the entire national and international telephony.

With time it was realized that in order to achieve rapid socio economic development and for global integration of the country a world class telecommunication infrastructure is mandatory. This required huge funds and to supplement the effort of the Government in this direction, private participation was thought to be essential. To liberalize the environment, the Government came up with some forward looking telecom policies from time to time. In 1994 the National Telecommunications Policy (NTP 94) was rolled out, the objectives of which included: provision of telephone on demand by 1997, availability of telecom service to all villages by 1997, provision of PCOs in urban areas for every 500 persons by 1997, introduction of value added services (VAS) that are already available internationally by 1996, and finally availability of world class telecommunication services at reasonable rates in India. To accomplish the targets set in NTP 94, Telecom Regulatory Authority of India (TRAI) was created in 1997 as a statutory and autonomous regulatory agency. Its purpose was to protect the interests of the consumers and the service providers alike, and to fix the telephone rate structure to prevent predatory pricing. NTP 94 was succeeded by NTP 1999 to fill the gaps that were left unfulfilled by the previous policy. The set target of NTP 1999 included provision of internet access facility by 2000 to all district headquarters, high speed data and

multimedia capabilities to towns with population over 200,000 by 2002, and achievement of overall tele-density of 15 and rural tele-density of 4 by 2010. Initially 21 licensed service areas (now 23) were identified, defined mainly by the state boundaries of India, for the issue of licenses, and separate operators' licenses were required to operate in each circle by the service providers. Following NTP 94, the Basic Telecom Service was first opened up for the private players as a duopoly market. Post NTP 99, grant of fresh licenses was sought in the 15 vacant service areas. In October 2000, the Bharat Sanchar Nigam Limited (BSNL) was formed to provide all types of telecom services including long distance connections across the nation, excepting Delhi and Mumbai. In November 2003, the Government came up with the Unified Access Service licenses, wherein any technology (both wireless and wire-line) could be used by the service providers. By September 2010 the subscriber base of Indian telecom had touched 700 million, far exceeding the target of 500 million set in NTP 99.

Two very notable factors about the Indian telecom sector are the dominance of the private players in the market and the growth of cellular services at a rate much faster than its fixed-line counterpart. The share of private sector increased to 87.13% in end March 2014 while that of the public sector stood only at 12.87% during the same period. NTP 2012 has a vision to "provide secure, reliable, affordable and high quality converged telecommunication services anytime, anywhere for an accelerated inclusive socio-economic development". Its objective is to increase the rural tele-density level to 70 by 2017 and to 100 by 2020, which was around 44.01 as on 31st March, 2014. To make the market attractive to the foreign investors the FDI limit for telecom services in the country has been raised from 74% to 100% in August 2013.

In this light the present study enquires into the tele-density trend and its compound rates of growth across the states of India over the period 2000-2014. Attempt has also been made to measure the inequality trend in tele-density across the states over the study period. The structure of the paper is as follows: Section 2 provides a brief review of the literature. Section 3 specifies the research objectives. Section 4 handles the data source and the methodological issues. Section 5 shows the results and discussion and Section 6 concludes the study.

Review of Literature

Kala Seetharam Sridhar and Varadharajan Sridhar (2007) empirically studied the relationship between telephone penetration and economic growth for developing countries using 3SLS method. Their analysis suggested that, after controlling for the labour and capital effects, the impact of mobile phones and land phones on national output is positive.

Sanjay Kumar Singh (2008) studied the diffusion of mobile phones in India. He estimated the future trends in mobile density using time series data, covering the period 1995-96 to 2005-06. The study uses S-shaped growth curve model to estimate the future trends in mobile density till the year 2015-16.

Varadharajan Sridhar (2010) made an econometric analysis of mobile services growth across regions in India to determine the effect of different techno-economic variables on the growth of mobile services in India. He found income, population size, penetration of fixed-line, competition, network effect etc. to affect mobile subscription, which widely vary across regions in India.

Kawaljeet Kaur and Neena Malhotra (2014) have studied the causal relationship between telecommunication development and GDP and its various components in India. A long run relationship between economic growth and growth of telecommunication has been observed. Their study indicated a causal relationship between telecommunication growth and growth of manufacturing and service sectors.

Research Objectives

1. To examine the tele-density trend and its disparity across the states/UT in India over the period 2000-2014.
2. To estimate the compound growth rate of tele-density across the states/UT over the periods (2000-2005), (2005-2010), (2010-2014) and (2000-2014).
3. To examine the trends of inequality of tele-density across the states/UT of India over the period under study.

Data source and Methodological Issues

This study broadly covers 17 states and 1 Union Territory (Delhi) of India. Data on state-wise tele-density during 2000-2014 has been taken from Ministry of Statistical and Programme Implementation (MOSPI), which has compiled the data from DoT, Delhi. Some recalculation of tele-density has however been done in certain cases in order to bring uniformity in the dataset. Population projection figures reported by Office of the Registrar General of India, has been used for the purpose.

As regards the methodological issues, the study has been broadly divided into 4 sections:

i. Tele-density Trend in India: The tele-density trend across the states of India over the study period has been analysed.

ii. Performance Analysis of Tele-density Across Indian States/UT: To study the tele-density performance of the states and the change in their relative positions overtime the ranks of the states have been found out, the state with the highest tele-density figure getting the lowest rank.

iii. Estimation of Growth For the purpose of growth analysis the compound growth rates of tele-density for the states are calculated for the entire period 2000-2014 and for the three sub-periods 2000-2005, 2005-2010 and 2010-2014. The compound growth rate formula used is

$$Y_t = Y_o (1 + r)^t$$

where Y_t and Y_o are the values of the indicator in the terminal year and the initial year respectively for a particular state. 'r' is the compound rate of growth.

iv. Measures of Inequality :

Inequality measures reflect the interpersonal difference within a given group. The concept is inspired by the Pigou-Dalton axiom which says that, other things remaining the same, any transfer from the rich to the poor must result in a decline in inequality.

In order to capture the disparity in the spread of the population among the states the following measures of inequality are adopted which considers the population share of each state:

a. **Lorenz Consistent Gini Coefficient (GINI):** This formula is derived from the Lorenz curve and is given by

$$GINI = 1/m \sum_{i=1} \sum_{j=1} f(y_i) f(y_j) |y_i - y_j|$$

y_i being the value of the indicator, $f(y_i)$ being the population share in state i and 'm' being the mean value of the indicator.

The Generalized Entropy (GE) set of measures which are also Lorenz consistent are presented below:

The GE measures are sensitive to various parts of the distribu

$$GE(2) = \sum_{i=1}^{n} f(y_i) [(y_i/m)a - 1], \quad a \neq 0, 1$$

$$GE(1) = \sum_{i=1}^{n} f(y_i)(y_i/m) \log(y_i/m), \quad a = 1$$

$$GE(0) = \sum_{i=1}^{n} f(y_i) \log(m/y_i), \quad a = 0$$

tion depending upon the value of 'a'. y_i is the value of the indicator for state i, $f(y_i)$ is the population share of state i in total population, 'm' is the mean value of the indicator and 'n' is the number of states. The study has calculated GE for 'a' = 0, 1 & 2.

Results and Discussion

5.1 Tele-density Trend in India

The overall tele-density figures of the Indian states during 2000-2014 have been provided in Table 1. To analyze the pattern of change in tele-density, each state may be studied one by one. Andhra Pradesh started with a tele-density of 3.13 in 2000. From here there was a gradual rise to 7.85 in 2004. In 2008 the value jumped up to 28.25. In fact the tele-density figure kept on rising till 2012 to reach 80.87, after which it slightly dipped to 79.52 in 2014. Assam had a tele-density of 1.06 in 2000. With time its performance improved. Initially the increase was mild till 2006, after which it started increasing rapidly from 14.74 in 2008 to 46.61 in 2012, finally reaching 48.74 in 2014. Bihar had the lowest tele-density in 2000 compared to the rest of the states covered in the study, and stood at only 0.65. From here the growth was modest till 2006 and touched 10.44 in 2008. The figure increased further touching 48.90 in 2012, after which there was a mild dip to 46.1 in 2014. The situation of Gujarat was relatively bright to start with, with a value of 4.26 in 2000. The rise was also substantial as it rose to 33.63 in 2008 and 91.13 in 2012. In 2014, however there was a fall in tele-density to 90.54. Haryana in 2000 stood at 3.36 from where it rose to 8.38 in 2004. The rise from here was quite impressive, jumping to 30.39 in 2008 and 89.42 in 2012. It ended with a slight decrease to 81.44 in 2014. Himachal Pradesh had a good beginning similar to Gujarat with a figure of 4.32 in 2000. The rise since then was moderate till 2006. Thereafter the pickup was sharp from 41.16 in 2008 to 120.68 in 2012. The state in 2014 witnessed a fall in tele-density to 105.59. Jammu & Kashmir started quite low in 2000 standing at 1.31. It increased at a low rate till 2004 and then increased its pace to reach 66.8 in 2014. Now a look at Karnataka shows that its performance was quite satisfactory too. It had a decent start relative to many other states and registered a modest rise in the beginning followed by a fast rise to 97.22 in 2012. Thereafter the figure dropped to 92.45 in 2014 as is evident from the

table.

Kerala showed a tele-density figure of 5.60 in 2000. A notable rise was observed from 2010 onwards and the figure reached 106.61 in 2012. Like most of the rest however, its tele-density then dropped to 96.19 in 2014. For Madhya Pradesh the record in 2000 was modest but a significant rise was observed in 2008 when its tele-density touched 16.27. The figure finally settled at 56.04 in 2014. Maharashtra made a good start at 5.40 in 2000 which kicked up in 2008 to a level of 27.42 and finally reached 77.32 by 2014. Orissa started very low at 1.21 and increased its pace touching 15 in 2008. This went up to 65.84 in 2012. The figure tapered down to 60.9 in 2014. Punjab started with a figure of 5.67 in 2000 which went up to 17.33 by 2004 and to 47.89 by 2008. The figure leaped to 113.13 in 2012 after which it dipped to 107.22 in 2014. Rajasthan in 2000 figured 2.11 which grew at a slow pace till 2006. The tele-density rose to 23.74 in 2008 and in 2014 the value touched 75.39. Tamil Nadu had a tele-density of 4.52 in 2000 and by 2008 reached 35.09. In 2012 the value reached a high of 116.61 and then fell to 111.14 in 2014. Uttar Pradesh showed a slow rise till 2006. The figure crossed 15.92 in 2008 and was 60.93 in 2012. In 2014 the value decreased to 57.27. West Bengal initially saw a very gradual increase in tele-density from the year 2000. The situation improved to some extent in 2008 when the figure touched 14.38. This went up to 61.52 in 2012 but in 2014 there was a slight fall to 55.13. Delhi the last in the list was always ahead of the rest considered in the study. In 2000 it had a tele-density of 15.40 which galloped up to 110.05 in 2008. By 2012 the figure reached 239.59 which was a remarkable rise but in 2014 it declined a bit to 226.84.

From the above analysis it can be conclusively stated that since 2008, there was a definite jump in the tele-density figures of all the states. However, it was also observed

Table 1: Overall Tele-density Trend in India during 2000-2014

States	2000	2004	2008	2012	2014
Andhra Pradesh	3.13	7.85	28.25	80.87	79.52
Assam	1.06	2.13	14.74	46.61	48.74
Bihar#	0.65	1.75	10.44	48.90	46.1
Gujarat	4.26	10.14	33.63	91.13	90.54
Haryana	3.36	8.38	30.39	89.42	81.44
Himachal Pradesh	4.32	10.14	41.16	120.68	105.59
Jammu & Kashmir	1.31	3.01	21.84	54.82	66.8
Karnataka	3.76	9.46	34.53	97.22	92.45
Kerala	5.60	14.87	45.34	106.61	96.19
Madhya Pradesh#	1.54	3.39	16.27	53.81	56.04
Maharashtra*	5.40	8.00*	27.42*	77.19*	77.32*
Orissa	1.21	2.95	15.00	65.84	60.9
Punjab	5.67	17.33	47.89	113.13	107.22
Rajasthan	2.11	4.50	23.74	72.96	75.39
Tamil Nadu*	4.52	8.54*	35.09*	116.61	111.14
Uttar Pradesh#	1.33	3.06	15.92	60.93	57.27
West Bengal#*	2.11	2.23*	14.38*	61.52*	55.13*
Delhi	15.40	41.79	110.05	238.59	226.84
India	2.86	7.08	26.22	78.66	75.23

 # Bihar, Madhya Pradesh, Uttar Pradesh and West Bengal include Jharkhand, Chattisgarh, Uttaranchal and Andaman & Nicobar respectively.
*The tele-density figures of Maharashtra, Tamil Nadu and West Bengal for

these years exclude Mumbai, Chennai and Kolkata respectively.

Source: MOSPI and Author's Calculation

that in 2014 for most of the states the tele-density figure has moved down, though the decrease was not very marked.

5.2 Performance Analysis of Tele-density Across States in India

To make a performance analysis of the states, the ranking of the states in terms of their tele-density figures given in Table 1 has been considered, where the state with the highest tele-density is assigned the lowest rank. The rank order of the states has been presented in Table 2. The table shows that leaving a few cases, the states/UT of India have nearly maintained the same positions throughout the study period. Delhi, Punjab, Karnataka, Tamil Nadu, Gujarat, Himachal Pradesh and Kerala maintained a high rank during the study period, occupying the first eight positions. Assam, Bihar, West Bengal, Orissa and Madhya Pradesh maintained a relatively low rank. Lastly, Andhra Pradesh, Haryana, Jammu & Kashmir, Rajasthan and Uttar Pradesh maintained a medium position all through the study period. In order to note the fluctuation in the overall performance of the states, the average rank and the standard deviation of ranks have been computed for each state, considering all the years under study. Table 3 reports the results.

The states showing significant dispersion in ranks are West Bengal, Tamil Nadu, Punjab, Maharashtra, Jammu & Kashmir, Orissa and Madhya Pradesh. Delhi however shows a considerable amount of stability and retains its first position throughout the study period.

Tamil Nadu has substantially improved its tele-density over the years and acquired the

Table 2: Ranking of States According to Tele- density (Author's Calculation based on Tele-density from 2000-2014)

States	2000	2004	2008	2012	2014
Andhra Pradesh	10	10	9	9	9
Assam	17	17	16	18	17
Bihar	18	18	18	17	18
Gujarat	7	4.5	7	7	7
Haryana	9	8	8	8	8
Himachal Pradesh	6	4.5	4	2	4
Jammu & Kashmir	15	14	12	15	12
Karnataka	8	6	6	6	6
Kerala	3	3	3	5	5
Madhya Pradesh	13	12	13	16	15
Maharashtra	4	9	10	10	10
Orissa	16	15	15	12	13
Punjab	2	2	2	4	3
Rajasthan	11.5	11	11	11	11
Tamil Nadu	5	7	5	3	2
Uttar Pradesh	14	13	14	14	14
West Bengal	11.5	16	17	13	16
Delhi	1	1	1	1	1

Source: Author's Calculation

second position in 2014. Himachal Pradesh has largely maintained its fourth position. The table further shows that the situation of Maharashtra has been getting worse with time. In fact

states like Maharashtra, Andhra Pradesh, Assam, Bihar, Madhya Pradesh, Uttar Pradesh and West Bengal need to give good effort to improve their tele-density.

5.3 Tele-density Growth Performances of the Indian States

The compound growth rates of tele-density for the states/UT of India during 2000-2014 based on overall tele-density have been computed. For this study we have considered 17 states and 1 Union Territory. Table 4 reports the compound tele-density growth rates of the states of India. From the table it is evident that the growth of tele-density has been quite impressive in India considering the entire period under study. A bird's eye view shows that the states of Jammu & Kashmir, Bihar, Assam, Uttar Pradesh and Orissa were the first five fastest growing states. Rajasthan, Haryana, Karnataka and Himachal Pradesh also registered good rates of growth during this period. On the other hand, Gujarat, Delhi, Tamil Nadu, West Bengal and Maharashtra were the five states/UT registering the lowest growth.

For a more detailed study, the whole period has also been divided into three nearly equal sub-periods, 2000-2005, 2005-2010 and 2010-2014. During 2000-2005, Jammu & Kashmir, Punjab, Bihar, Kerala and Delhi registered quite high growth rates ranging between 31.24% (Jammu & Kashmir) and 27.03% (Delhi). States like Himachal Pradesh, Haryana, Gujarat, Tamil Nadu, Uttar Pradesh, Rajasthan, Orissa and Assam have also performed fairly well. The lowest growth rates were registered by Maharashtra (13.14%) and West Bengal (7.65%).

Coming to the second sub-period (2005-2010), growth rates of all the states have substantially increased during this period, excepting for Punjab whose growth rate dropped compared to that in the first sub-period. In this second sub-period the highest growth rate in tele-density was achieved by Bihar (66.49%), followed by West Bengal (62.71%), Assam (60.80%), Orissa (58.25%), Jammu & Kashmir (57.87%) and Uttar

Table 3: Average Rank and Standard Deviation of Ranks of Tele-density of Indian States during 2000-2014 (Author's Calculation based on Tele- density)

States	Average Rank	SD of Rank
Andhra Pradesh	9.33	0.62
Assam	16.80	0.86
Bihar	17.80	0.41
Gujarat	6.37	1.11
Haryana	8.07	0.70
Himachal Pradesh	3.97	1.29
Jammu & Kashmir	12.93	1.39
Karnataka	6.13	0.83
Kerala	3.20	1.08
Madhya Pradesh	13.93	1.49
Maharashtra	8.93	2.12
Orissa	14.13	1.51
Punjab	2.73	0.80
Rajasthan	11.17	0.52
Tamil Nadu	5.33	1.88
Uttar Pradesh	13.93	0.59
West Bengal	15.23	2.08
Delhi	1.00	0.00

Source: Author's Calculation

Pradesh (55.28%). The lowest growth rate was registered by Delhi (27.63%), the second last by Punjab (28.02%) and the third last by Kerala (33.76%). During the third sub-period, there has been surprisingly a huge drop in the growth rates of all the states.

The first place in this last sub-period was attained by Assam (12.91%), second place attained by Madhya Pradesh (12.26%), third place by West Bengal (12.21%) and the fourth by Orissa (11.57%). It is interesting to note that only Haryana, Tamil Nadu and Orissa could maintain their previous positions in both the second and third sub-periods. Gujarat has shown a marked improvement, moving to the 5th position in

Table 4: Compound Growth Rate of Tele-density Across States in India

States/UT	Whole period 2000-2014	2000-2005	2005-2010	2010-2014
Andhra Pradesh	29.98	24.81	43.27	8.57
Assam	37.29	21.36	60.80	12.91
Bihar	38.55	29.31	66.49	11.28
Gujarat	28.12	24.48	35.65	11.56
Haryana	31.72	26.37	40.69	8.07
Himachal Pradesh	30.98	24.88	43.33	7.40
Jammu & Kashmir	43.12	31.24	57.87	7.56
Karnataka	31.12	26.52	40.95	8.06
Kerala	29.14	27.37	33.76	4.60
Madhya Pradesh	30.53	23.03	52.06	12.26
Maharashtra	19.49	13.14	38.11	11.35
Orissa	34.24	26.76	58.25	11.57
Punjab	30.76	31.08	28.02	9.19
Rajasthan	32.95	23.74	53.85	9.33
Tamil Nadu	25.81	20.26	45.57	10.59
Uttar Pradesh	34.72	25.50	55.28	11.26
West Bengal	22.39	7.65	62.71	12.21
Delhi	28.04	27.03	27.63	7.09
India	**26.31**	**25.63**	**42.58**	**9.29**

Source: Author's Calculation based on Tele-density during-2000-2014

the third sub-period from its 15th position in the second sub-period. Opposite was observed for Jammu & Kashmir, which slipped from 5th position in the second sub-period to 15th position in the third sub-period. To sum up, for Assam, Madhya Pradesh, Maharashtra and Punjab, there has been an improvement in their positions, while for the rest (excepting Haryana, Tamil Nadu and Orissa whose positions remained unchanged from the previous sub-period), the situation was the reverse.

5.4 Inequality Trends in Tele-density of Indian States

In order to measure the inequality trends in tele-density across the states, several measures of inequality have been computed. The inequality measures considered for the study are the Lorenz Consistent Gini Coefficient (GINI) and the Generalized Entropy set of measures (for 'a' = 0, 1 & 2). The measures have been used to calculate inequality for some selected years. Table 5 compiles the results.

From the table it can be gathered that the measures of inequality have on the whole showed similar pattern with some slight differences. The GINI shows that compared to 2000 there was an increase in inequality in 2004. After 2004 there was a sharp decline in inequality across the states. This observation has been supported by the GE (0), GE (1) and GE (2) set of measures as well. The GINI and GE(2) measure are seen to drop at a much faster rate than the other GE measures suggesting that the sensitiveness of these measures to different parts of the distribution are different.

Table 5: Measures of Inequality in Overall Tele-density

Year	GINI	GE(0)	GE(1)	GE(2)

2000	0.7643	0.2607	0.2553	0.6389
2004	0.7892	0.2727	0.2921	0.8495
2008	0.5453	0.1239	0.1370	0.3602
2012	0.3557	0.0526	0.0595	0.1472
2014	0.3468	0.0516	0.0581	0.1429

GINI: Lorenz Consistent Gini Coefficient;
GE: Generalized Entropy
Source: Author's Calculation

6. Conclusion

The study aims to make a trend analysis and rank analysis of tele-density during 2000-2014 for 17 states and 1 Union Territory of India. It also focuses on the estimation of compound growth rates of tele-density of the states/UT for the entire period under study and for the three sub-periods, 2000-2005, 2005-2010 and 2010-2014. Lastly, a study of the inequality trend in teledensity across the states of India has also been considered.

Trend analysis of the states has revealed that in India the tele-density figure has risen significantly in 2008 and then again in 2012 in general. In 2014 there was a slight decrease in the tele-density figure of India. Focusing on the states bring to light that for Andhra Pradesh, Bihar, Haryana, Himachal Pradesh, Karnataka, Kerala, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal and Delhi, the tele-density figures have followed a similar pattern as pictured by India. For the states of Assam, Jammu & Kashmir, Madhya Pradesh, Maharashtra and Rajasthan, tele-density has shown a constant rise throughout the period under study. From the ranking of the states we found that on the average Delhi has maintained the lowest rank, followed by Punjab, Kerala, Himachal Pradesh, Tamil Nadu, Gujarat, Haryana, Maharashtra and Andhra Pradesh. The rest of the states had higher average rank.

The compound growth rates of tele-density for all the states/UT have been considered over the period 2000-2014. It revealed that the states of Jammu & Kashmir, Bihar, Assam, Uttar Pradesh and Orissa were the first five fastest growing states. On the other hand, Gujarat, Delhi, Tamil Nadu, West Bengal, Maharashtra were the five states/UT registering the lowest growth during the period 2000-2014. Splitting this study period into three sub-periods showed more interesting facts. During 2000-2005, Jammu & Kashmir, Punjab, Bihar, Kerala and Delhi registered quite high growth rates ranging between 31.24% (Jammu & Kashmir) and 27.03% (Delhi). The trailing states were Maharashtra and West Bengal. In 2005-2010 excepting Punjab, all the other states recorded a substantial rise in growth rates. The highest growth rate in tele-density was achieved by Bihar (66.49%), followed by West Bengal (62.71%), Assam (60.80%), Orissa (58.25%), Jammu & Kashmir (57.87%) and Uttar Pradesh (55.28%). In the third sub-period i.e., during 2010-2014, there was a drastic fall in the growth rates of all the states. The relatively leading states during this period were Assam, Madhya Pradesh, West Bengal and Orissa. As regards the inequality trends across states of India, it was found that on the whole inequality over the years have tended to decrease during the study period. There has been an initial increase in inequality from the year 2000 to 2004 after which there has been a sharp fall in the figures.

The above analysis shows that the performance of the telecommunication sector has been quite satisfactory in India. The tele-density of the country has far exceeded the targets that were set in the telecom policies from time to time. The effort of the government in this regard including opening up of the market to private players, and the penetration of mobile services into rural areas have been the key factors contributing to the success of this sector.

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