

# Determining the Role of FDI in Plummeting the Digital Divide

## Jyoti Gupta

Research Scholar  
(Maharaja Surajmal Brij University)

## Dr. Vivek Sharma

Professor  
(Maharaja Surajmal Brij University)

### Abstract:

There exists a gap between the rural and urban areas in terms of access to Information and Communication Technologies, which is known as Digital Divide. Many studies have been conducted in identifying the determinants of the digital divide but no single analysis fit on all the determinants. This study is an attempt to identify the average digital divide catered by two categories of the Telecom companies. In Category I there are companies which are backed by foreign direct investment and in Category II there are state owned telecom companies. The Digital Divide Index (DDI) have been calculated by using the simple approach of Index numbers and then t-test for differences in means is applied to test the significance of the difference between the average values of DDI obtained from the two categories.

**Keywords:** Digital Divide Index, Foreign Direct Investment, Telecom Sector, Service Providers, Subscribers

### Introduction

In the current era, Communication Technologies has become like the blood in the veins of the society. Whether it is about creating employment, searching right individual for the right place, social engagements, political participation, spreading awareness, etc., it is important for establishing connections.

But the irony of the society is that these technological advantages are not spread equally amongst all the region of the nation. This has been previously identified with the help of many studies and the unequal spread of the technological benefits is popularly known as 'Digital Divide'. The term 'digital divide' refers to "the gap between individuals, households, businesses and geographic areas at the different socio-economic levels with regard to their opportunities to access Information and Communication Technologies (ICTs) and their use of Internet" (David & Amey, 2020, p.6). Digital Divide in simple terms is a condition in which the ICTs measures are not in access of all the individuals of the society. Such measures could be Fixed Telephone Lines, Wireless and Internet Facilities. Telecommunication is not only a means of sharing information nowadays rather it has become a necessity in the lives of human beings. In such a situation it is imperative for the individual to have access to these services.

Being the second largest country in terms of population and also on the point of attaining second position in Telecommunication Sector, India has achieved remarkable growth in the Telecom Industry. The industry is also amongst the major source of contribution in GDP but in spite of many reforms and developmental policies this success is still ambiguous. The reason behind such ambiguity is the lack of services in the rural areas of the country. It is known to everyone that in India the majority of population lives in rural areas and for attaining the benefits of manpower and extended market size, the companies

need to focus on rural regions as well. But still there is not much Telecommunication facilities available in such regions (Rao, 2005; Sampath Kumar & Shiva Kumara, 2018; Singh, 2010). After Liberalization undoubtedly many efforts have been extended for development of these services in the rural region but still there is a huge gap identified in the urban and rural tele-density. It is suggested that there is a need of upgraded and advanced infrastructure, digital literacy and technological advancements in rural areas for reducing the digital divide (Sharma, 2020).

### **Literature Review**

This study identifies the determinants of Digital Divide by analysing various multi regional determinants in the EU. It used panel data for multilevel analysis. But the results are not very far away from the expectations. It states that only the mix of governmental and industrial strategies can work effectively on reducing the digital divide. A few factors mentioned in the study are literacy rate in the backward areas, R & D development, regional economic growth, etc. (Szeles, 2018).

A study was conducted on Great Britain and the nature of Urban rural digital divide. The researcher considered the case of vignettes and tries to elaborate the extensiveness of the digital divide in the Britain. It was also identified that the divide keeps on increasing and benefitting urban areas only and the rural areas still remain backward and lacks technological development (Philip et al., 2017). For increasing productivity and growth in the country it's imperative to clear the digital divide. The study highlights the importance of policy framework and institutional investment in rectifying the issue of digital divide. The study identified direct relationship between institutional quality and level of investment. Also, transparency, political interference, judicial system, property rights are the major cause of concern for the operators (Jung, 2020). The study identified an another way of bridging the gap of digital divide. The study undertakes the case of frugal digital ICTs for which frugal smartphones were considered as the relevant case. It was found that the frugal digital ICT spreads more rapidly in developing countries rather than in developed countries (Zhang, 2018). The researcher was expecting the language barrier as a cause of digital divide while undertaking the study on 45 countries. But it was a myth and after analysis it was found that the educational and economic imbalances with geography are the major barriers in bridging the gap of digital divide (Cruz-Jesus et al., 2018).

### **Objective of the Study:**

To identify the impact of Foreign Direct Investment on Digital Divide in India

This objective is stated to find the role of FDI in plummeting Digital Divide in India. There are a few telecom companies which are backed by foreign investment but state-owned telcos are not backed by the FDI. So, the present study will try to identify the reality behind this fact.

### **Research Methodology:**

This study is based on the recent trends in the Telecommunication industry. Looking at the services provided in the sector, they are broadly divided into two broad categories which are Wireless Services and Wireline Services. From the point of view of analysis, the present study has captured the subscribers of wireless services. The reason behind selecting the wireless services is that the wireline subscriber's base is negligible in the country and can be ignored while analysing the recent trends. It is presented in Chart 1.1 which has been extracted from the year (2019) end report provided by Telecom Regulatory Authority of India.

**Chart 1.1**  
Composition of Market Share Wireless and Wireline Subscribers

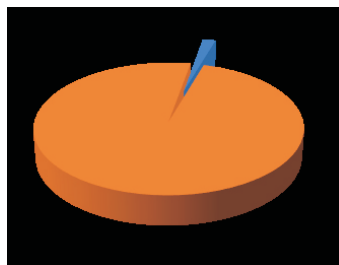


**Source: (TRAI, 2019)**

In Table 1.1 it has been mentioned that there are six wireless service providers which are currently operating in the industry but from the analysis point of view only five have been considered. Reliance Communications has been removed from the analysis due the reason that it had declared itself bankrupt in the recent past and currently not providing services to any subscribers. As per the latest report of TRAI (2019b) its market share had been recorded as 0.001 from the last two years.

**Sampling:**

As mentioned in the above paragraph, the complete enumeration method is adopted in the study and the sample size is equal to the population which is the total number of service providers in the industry.



List of Wireless Service Providers as on 31st December, 2019

Sl.No.	Service Provider	Area of Operation
1	Bharti Airtel Ltd	All India
2	Reliance Communications/ Reliance Telecom Ltd	All India (except Assam & NE) / Kolkata, MP, WB, HP, Bihar, Odisha, Assam & NE
3	Vodafone Idea Ltd	All India
4	BSNL	All India (except Delhi & Mumbai)
5	MTNL	Delhi & Mumbai
6	Reliance Jio Infocom Ltd	All India

**Source: (TRAI, 2019b)**

Therefore, in the present study only five out of six service providers have been considered for the analysis and divided into two categories. Category I comprises of three Private Sector Service Providers who've acquired Foreign Direct Investment from any of the international source. Category II comprises of two state owned service providers which are Bharat Sanchar Nigam Limited d/b/a BSNL and Mahanagar Telephone Nigam Limited, d/b/a MTNL. The area of their operations are mentioned in Table 1.1.

**Time Period of the Study:** The study has been conducted on the subscribers from 2015 to 2019 only. The reason behind selecting such years is to reflect the recent trends. It has been observed that before 2015 the trends in the industry were entirely different and there were many service providers. But after the debut of Reliance Jio in 2016, many of them opted for the exit route or merged with the existing service providers.

**Source of Data for Analysis:** In the year ending performance reports of TRAI, the data of Rural and total number of subscribers are provided. Values of rural subscribers are extracted directly form there and for urban subscribers the values are retrieved by subtracting number of rural subscribers from the total number of subscribers (See Table 1.2 & 1.3).

**Table 1.2**  
Rural and Urban Wireless Subscribers of Category I  
(With Foreign Direct Investment) (in millions)

Year	Bharti Airtel+Telenor		Vodafone Idea		Reliance Jio	
	Rural Subscribers	Urban Subscribers	Rural Subscribers	Urban Subscribers	Rural Subscribers	Urban Subscribers
15-Dec	133.16	160.83	197.28	168.31	-	-
16-Dec	130.57	135.28	214.29	180.92	4.12	68.04
17-Dec	159.89*	142.22	220.93**	188.1	41.08	119.01
18-Dec	168.63	171.63	220.71	198.04	100.47	179.65
19-Dec	145.48	181.82	172.44	160.17	152.14	217.88

Source: TRAI (2015, 2016, 2017, 2018, 2019a)

**Table 1.3**  
Rural and Urban Wireless Subscribers of Category II  
(Without Foreign Direct Investment)

YEAR	BSNL(All India except Delhi and Mumbai)		MTNL(Delhi & Mumbai)	
	Rural Subscribers	Urban Subscribers	Rural Subscribers	Urban Subscribers
15-Dec	27.53	54.97	0	3.61
16-Dec	31.63	65.16	0.05	3.58
17-Dec	35	72.92	0.05	3.53
18-Dec	39.04	75.33	0.05	3.42
19-Dec	37.35	80.77	0.05	3.33

**Source: TRAI(2015, 2016, 2017, 2018, 2019a)**

There are 3 leading private service providers in the industry as per the latest reports of TRAI but above mentioned three are the leading service providers. Bharti Airtel reported the subscribers of Tata Tele (TRAI, 2019a). Also, Quadrant is serving in the state of Punjab only and Reliance Communications had already reported itself bankrupt before lockdown. Although the news about the merger of BSNL and MTNL was also in the air but nothing can be said confidently until it happens.

For the year 2018, Telenor merged with Bharti Airtel and the TRAI reported the total values, Vodafone and Idea merged, Tata Tele and Reliance Communications were reporting negligible subscribers (TRAI, 2018).

For the year 2017, There were 12 wireless service providers. But Sistema Shyam merged with Reliance communications.

Bharti Airtel merged with Telenor therefore the total number of subscribers includes the values of Bharti and Telenor. Vodafone and Idea merged in 2018 therefore, total of their subscribers has been considered. The reason behind doing this is that the subscriber's base of merging companies, also merged ultimately.

For year 2017, even after merger the Reliance communications didn't manage to gain enough subscribers. Also, the subscribers of Tata were very few in numbers, so couldn't affect the analysis. Aircel was the company which reported 30.81 million rural subscribers in 2017 but it vanished in 2018 therefore, it has been considered void and null from the point of view of analysis. It is expected that the subscribers of Aircel might have opted for another service provider or they are still lacking the services.

On Feb 15, 2017 the Videocon telecom announced shutting down its operations. It was a small telecom company which got licences and permit in 17 circles in nation in 2008 lost all its permit in 2012 in 2G spectrum scam but after bidding again it won the airwaves. It also received approval for GSM and dual technology but the authority denied its permits in 2015 after which the company couldn't make it to survival.

Same is the case with Quadrant but the TRAI ordered the Telco to serve the subscribers till the expiration of its license. For which it denied.

There were nearly about 85 million subscribers of the Aircel, which are not less in number. But the company was fourth in the list of those telcos who bankrupted after the entry debut of Jio in Reliance Jio in September 2016. It was lying under the heavy burden of 15,500 crore debt and was planning to merge with Reliance communication but due to regulatory delays and lack of consensus in loan restructuring, the merger couldn't happen. So, after filling the bankruptcy, it was notified by the TRAI to all the subscribers of AIRCEL to opt for number porting. By 31st August 2019, they have to shift their plan to Jio, Bharti Airtel, MTNL or BSNL. Due to this reason, the subscribers of AIRCEL weren't included in DDI calculation as they were already spread between the companies considered for analysis.

### **Statistical Technique:**

**The famous 'Index Numbers' approach has been adopted in the study. The calculation was based on the below given formulae:**

$$\begin{aligned} \text{Rural Tele-density} &= (\text{Total Rural Wireless Subscribers} / \text{Rural Population}) * 100 \\ \text{Urban Tele-density (TD)} &= (\text{Total Urban Wireless Subscribers} / \text{Urban Population}) * 100 \\ \text{Urban- Rural Digital Divide Index} &= (\text{Urban Tele-density} / \text{Rural Tele-density}) * 100. \end{aligned}$$

## Data Analysis:

**Table:1.4**  
Digital Divide Index for Category I

YEARS	Total Rural Wireless Subscribers	Total Urban Wireless Subscribers	Rural Population	Urban Population	Rural Tele Density	Urban Tele Density	Digital Divide Index= (Urban Tele-density/ Rural Tele-density) *100
15-Dec	330.44	329.14	881	429	37.50738	76.72261	204.5534
16-Dec	348.98	384.24	885	439	39.43277	87.5262	221.9631
17-Dec	421.9	449.33	889	450	47.45782	99.85111	210.3997
18-Dec	489.81	549.32	892	460	54.91143	119.4174	217.4727
19-Dec	470.06	559.87	897	472	52.40357	118.6165	226.352

**Source: Author**

Table 1.4 depicts ambiguous results of the DDI for the years 2015-2019. The DDI for the year 2015 was 204.5 which instead of declining, grew more every year. In the year 2019 it was 226.352 which is higher than the previous five year's DDI.

**Table: 1.5**  
Digital Divide Index for Category II

Year	Total Rural Wireless Subscribers	Total Urban Wireless Subscribers	Rural Population	Urban Population	Rural Tele Density	Urban Tele Density	Digital Divide Index= (Urban Tele-density/ Rural Tele-density) *100
15-Dec	27.53	58.58	881	429	3.124858	13.65501	436.9802
16-Dec	31.68	68.74	885	439	3.579661	15.65831	437.4245
17-Dec	35.05	76.45	889	450	3.942632	16.98889	430.9022
18-Dec	39.09	78.75	892	460	4.382287	17.11957	390.6537
19-Dec	37.4	84.1	897	472	4.169454	17.8178	427.3413

**Source: Author**

Table 1.5 depicts the DDI for the Category II which declined in year 2018 but again showed increment in year 2019.

**Table 1.6**  
DDI for Category I, Category II and DDI of India with the Annual Growth Rates

Year	Digital Divide Index for Category I	Annual growth rate of DDI for Category I	Digital Divide Index for Category II	Annual growth rate of DDI for Category II	Digital Divide Index for India	Annual growth rate of DDI for India
15-Dec	204.5534		436.9802		316.24	
16-Dec	221.9631	17.4097	437.4245	0.444288	312.3391	-3.9009
17-Dec	210.3997	-11.5634	430.9022	-6.5223	290.4051	-21.934
18-Dec	217.4727	7.073	390.6537	-40.2485	262.8571	-27.548
19-Dec	226.352	8.8793	427.3413	36.6876	269.374	6.5169

**Source: Author**



Table 1.6 indicates that the Digital Divide Index of India has declined substantially from the year 2015 however a slight increment has been noticed in the year 2019.

Null Hypothesis: There is no significant difference between the average DDI of Category I and the average DDI of the Category II.

**Table 1.7**  
t-Test: Two-Sample Assuming Unequal Variances

	Digital Divide Index for Category I	Digital Divide Index for Category II
Mean	216.14818	424.66038
Variance	76.792384	379.3256644
Observations	5	5
Hypothesized Mean Difference	0	
df	6	
t Stat	-21.83121184	
P(T<=t) one-tail	3.02E-07	
t Critical one-tail	1.943180281	
P(T<=t) two-tail	6.03E-07	
t Critical two-tail	2.446911851	

**Source: Author**

### Findings:

The values of DDI of Category I which includes telcos having back up of FDI in the companies, is less than the DDI of Category II of Non FDI telcos. But the results of annual growth rates are quite ambiguous and unable to reflect the right nature of the DDI difference in the two categories. In the initial years it has been observed in both the cases that DDI has been reduced but in the latent years the DDI showed increased values. The t-test for differences of means have been used for interpreting the true nature of the DDI calculated. The p-value is less than 0.01 therefore reject the null hypothesis therefore it can be stated that the average difference between the DDI of two categories is significant. Therefore, after ignoring the temporary effects it can be stated that the telcos which are backed up by the FDI are able identify the need of catering rural market. They are undoubtedly engaged in doing so, which will benefit them in future as the largest part of Indian population resides in rural areas only. But the Stated owned companies are lagging behind in such issue and unable to cater the needs of rural areas. It is also possible that they thrust for expansion has been reduced and the private owners are still fighting for the market share.

### Conclusion:

The study addressed the unequal diffusion of Telecom Services in the rural and urban areas of the nation, which is popularly known as Digital Divide. After dividing the leading telecom service providers into two categories, one with FDI and another without FDI, it has been identified that the telcos backed with FDI are contributing more in reducing Digital Divide and the difference between their contribution is significant. It is essential for the industry

players to identify the rural market as an opportunity and extract maximum revenue from it.

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