



Theoretical Analysis of 5G Services in Indian Market

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Dr. Shalini Gupta¹ ✉

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¹Associate Professor, Department of Commerce, M. P. G. College, Mussoorie, Uttarakhand, India.

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ABSTRACT

There are a wide variety of theories that are being used to research mobile services adoption. As a result, various models and a large number of factors affecting adoption have been used to conceptualize the adoption of mobile services as technology advances and accelerates. The consequence has been that the mobile services adoption concept is at present chaotic and complex at best. The industry is going through a stagnating customer base and revenue and all the hopes of a bounce back are focused on 5G. The Indian market, which is currently one of the largest and fastest-growing, is also witnessing several challenges due to these dynamics. There are issues of stagnating customer base and revenue, tough competition, customer retention as well as urban and rural disparity. A concept that can clearly define mobile services adoption for all kinds of services and be universally applicable will be useful for the entire concerned stakeholders, especially in the Indian context.

1. TELECOMMUNICATION IN INDIA: A HISTORY

The British brought telecommunication in India. In 1881, the government gave Oriental Telephone Company Limited of England, a license for telephone exchanges at Kolkata, Mumbai, Chennai, and Ahmadabad. Soon, a central exchange was started in Kolkata with 93 subscribers. In 1887, another exchange became operational in Mumbai. The telegraph and the telephone were perceived as tools of control and as a machine to maintain law and order. The telegraph and telephone were combined with postal services to further consolidate control. The Indo-European Telegraph Department was renamed as, Overseas Communication and it was also finally merged with Indian Telegraph Department. Two services, Post Office and Telegraph Department started developing together under the Post & Telegraph department. In 1923, Indian Radio Telegraph Company (IRT) was formed. From the beginning, the telecom services were to be run on a nonprofit basis. This was to be the policy of

independent India also.

After independence, all the foreign telecommunication companies were nationalized to form Postal, Telegraph, and Telephone (PTT) in a government-administered monopoly under the ministry of communication. It included all the networks of telegraphs and telephones along with those that existed in the former princely states. In 1985, The Department of Telecommunication (DoT) was established. It was an exclusive service provider of domestic and long-distance telecommunication services. It also functioned as its own regulator (Mukherji, 2009).

The objective of the government to start Telecom as a government-controlled monopoly was to provide the country with a modern system of communication infrastructure, utilizing the existing telegraph network and expand the existing telephone lines (Nayak & Maclean, 2013). For many years Indian consumers had no choice in service or control over its quality. Working as a slow moving, overstaffed government machinery under the

blessing of the ministry, the performance of the telecommunication sector was miserable till the mid 80s. By the mid of 1980s, the waiting list for telephones was around 1 million, rising to 3 million by 1990s. The situation gave rise to rampant bribery and corruption (Nayak & Maclean, 2013). Independent India started with 84000 lines servicing a population of 350 million. By the 1980s, the connections grew up to 2.5 million lines servicing a population of 700 million. Only 3% of the 6,00,000 villages were connected telephonically. The telecom sector in India suffered from abysmally low tele-density, poor state of infrastructure, restrictive portfolio of services, a highly bureaucratic structure and high tariff rates (Prasad, 2008).

2. LIBERALIZATION OF TELECOM

In a bid to improve telecommunication services and reduce government influence DoT was set up in 1985 to provide domestic and long distance telephone services. But this only strengthened the monopoly as DoT became a policy maker, regulator and service provider, all rolled into one (Mukherji, 2009). It was responsible for formulating telecom policies for accelerated growth. As a policy maker, regulator and service provider, it was strongly inclined to control the rules in favor of government owned telecom companies (Mukherji, 2009)

To boost up the the slow progress of telecommunication in India, a committee was set up by the parliament in 1981 to make an in-depth analysis of the telecom situation and give recommendations for improving the network (Vercruysse, 1990). The then Prime Minister Rajiv Gandhi played a very proactive role in giving more policy attention to telecommunication by strongly supporting the information revolution during his tenure from 1984 to 1989. The electronic industry was increasingly considered as the key to modernization. A "Mission Better Telecom" with a very ambitious target for the year 2000 was setup that time to improve telecommunication services (Vercruysse, 1990). This started the work on the liberalization of telecom. As a result, Telecom became a national priority in the Seventh National Plan (Nayak & Maclean, 2013).

MTNL and VSNL were created to dilute the role of government in running telecom services and also to earn profit from their services (Vercruysse, 1990). Historically, the efforts to liberalize the telecom sector had begun in the 80s with the entry of private players in the manufacturing of telecom equipment and the corporatization of Telecom with MTNL & VSNL (Vercruysse, 1990). Sam Pitroda, a key government protégé, started the Centre for Development of Telematics in 1984. It was an autonomous organization established for the purpose of research and development in telecom. It was successful in bringing digital fixed line exchanges suitable to Indian conditions and also breaking the state monopoly in rural enterprise and equipment manufacturing (Nayak & Maclean, 2013).

3. REVIEW OF LITERATURE

Anand Deo (2017) studied that the Telecommunication sector has become an integral part of the Indian economy. While the industry is working under stringent regulations, latest government policies are providing this sector with good growth opportunities through reduced spectrum charges and flexible rate plans. It was expected that tele-companies to avoid bidding for the band, given the rising price, the financial burden on the debt-ridden telecom industry and more cutthroat competition following the entry of Reliance Jio Infocomm Ltd. Some challenges are Substantial Investments in 4G Infrastructure, Lack of Telecom Infrastructure in Semi-rural and Rural areas, Pressure on Margins Due to Stiff Competition, Rapidly Falling ARPU (Average Revenue per User), Delays in Roll Out of Innovative Products and Services, Limited Spectrum Availability and Low Broad Band Penetration.

Kapil Kumar (2017) observed that all operators must aspire to take their pie in the overall data market space. In order to achieve this, operators have to face the following challenges: Availability of sufficient spectrum; Technology to enable faster connections and availability by new compression and other techniques; Making things more innovative and

Table 1: Total Telecom Subscribers in India as on 31 December 2021

Telecom Subscribers (Wireless + Wireline)	
Total Subscribers	1,178,41 Million
% change over the previous year	0.39
Urban Subscribers	655, 20 Million
Rural Subscribers	523.21 Million
Market Share of Private Operators	89.44%
Market Share of PSU Operators	10.86%
Wireless Subscribers	
Total Wireless Subscribers	1,154,62 Million
% Change over the previous year	0.07
Urban Subscriber	633.34 Million
Rural Subscribers	521.28 Million
Market Share of Private Operators	89.81%
Market Share of PSU Operators	10.19%
Wireline Subscribers	
Total Wireline Subscribers	23.79 Million
% Change over the previous year	18.63
Urban Subscribers	21.86 Million
Rural Subscribers	01.93 Million
Market Share of Private Operators	56.50%
Market Share of PSU Operators	43.50%
Internet/ Broadband Subscribers	
Total Internet Subscribers	829.30 Million
% Change over the previous year	4.29
Narrowband Subscribers	37.21 Million
Broadband Subscribers	792.08 Million
Wired Internet Subscribers	26.58 Million
Wireless Internet Subscribers	802.72 Million
Urban Internet Subscribers	496.20 Million
Rural Internet Subscribers	333.10 Million
Total Internet Subscribers per 100 population	60.46
Urban Internet Subscribers per 100 population	103.95
Rural Internet Subscribers per 100 population	37.25

Source: Telecom Regulatory Authority of India Yearly Performance Indicators Indian Telecom Sector (Sixth Edition) 2021

interesting applications for customer friendly usage; The government and the regulators (TRAI) must provide the appropriate mix of policy to help in making all that happen and in the whole echo system all stakeholders such as operators, phone manufacturers, software & application developers, infrastructure providers should remain agile and healthy.

Vani Kola et. al. (2018) analyzed that telecom operators get more revenue from data

(50% of total revenue) than voice (20% of total revenue) in the most developed markets. However, it seems this balance of the distribution will shift over the next 3-4 years, and data will emerge as a major contributor to the top line. Estimated numbers show us that instead of 120M subscribers consuming an average of 1GB of data per month, as in 2016, about 500M subscribers will consume around an average of 10GB of data per month.

4. THE CASE OF 5G

The first two industrial revolutions were centered on steam, mechanization and then electricity and mass production. The third revolution involved electronics, information technology and automation. The fourth revolution has been predicted as a buildup of the third but with a far greater impact. It is going to be disruptive and will transform production, management and governance. It will connect billions of people with smart devices with unlimited processing power and will be augmented by innovation in Artificial Intelligence (AI), robotics, and many more applications. This will be enabled by 5G technology (Gupta et al., 2018).

The world is moving from 5G trials to commercialization and more than 50 countries will launch 5G services. In some countries such as the US, China, Australia and some Gulf countries, it is happening earlier than planned (GSMA Intelligence, Report 2019). It could be launched in India by end of 2022. It is expected that 5G will create new sources of revenue, build new competition drivers and create new markets (Frias & Martinez, 2018; GSMA INTELLIGENCE, Report 2019). India has big hopes from 5G, from operators to its government as a tool for financial and social inclusion of all sections of the society across all regions. It can also enable expansion of IT across manufacturing, educational, healthcare, agricultural, financial and social sectors (GSMA INTELLIGENCE, Report 2019).

5G is the fifth generation of the standard of telecommunication technology. It will be a complete wireless communication with no limitations (Suhail, 2019). The telecom industry considers it to be a successor of LTE and it will have importance for IoT. There is no specific defined technology for 5G, but rather there are many candidate technologies for it. It will use higher frequency bands to provide support to expected traffic explosion. Keeping all expectations being made from 5G, it will need to meet certain requirements. Higher traffic capacity, higher data rate, massive device connectivity, reduced latency to support augmented reality and M2M uses, energy saving

and cost reduction are the requirements that need to be met by the new technology. The flexibility, elasticity and the scalability in 5G will be provided by the use of technology such as Software Defined Networks (SDN) and Network Function Virtualization (NFV), which underpins the 5G technology (Frias & Martinez, 2017). 5G due to its use can be termed as the most disruptive technology (Gupta et al., 2018).

5. IMPACT OF 5G ON USERS

5G will provide the experience of an ultrafast broadband with integrated low latency and ultra-reliable capability (Frias & Martinez, 2017). Ultimately it is an opportunity to empower the citizens and the businesses. It will transform the cities into smart cities and allow the citizens to partake in the socio-economic benefits delivered by the advanced, data intensive, digital economy (ITU, 2018). Some of the impacts of the new technology could be felt in the IoT and Internet of vehicles, mobile cloud computing, smart grids, big data, and device communication. Some of the services envisaged as a result of 5G are as given under:

- High Speed with High Capacity Large Broadcasting of Data in GBPS.
- UHD Video Streaming and Downloading Emergency/Disaster Systems.
- Vehicle To Vehicle and Machine To Machine Communication Augmented Reality.
- Industry Automation.
- Mission Critical Applications such as Health care to individual's age, income, caste, community, occupation, education, expenditure and employment etc.

6. THE CHALLENGE BEFORE 5G

The 5G technology requires high investment, therefore, till the results and the benefits become more visible, the policymakers and the industry may approach it cautiously and may focus on enhancing the 4G network (Forge & Blackman, 2017; ITU, 2018). The commercial viability of the technology has not been tested. The needs of the individual consumers and the business have not been assessed objectively. Their desire to pay for 5G enabled services has not been tested. It is primarily a scenario based

on optimism (Forge & Blackman, 2017; GSMA INTELLIGENCE. 2019). It is an unproven technology, with untested use cases and uncertain demand.

Some other technical challenges such as spectrum with higher frequency bands, signal attenuation, and penetration of solid materials without losses also confront the smooth implementation of 5G (Al-Falahy & Alani, 2017). 5G in the early stages will not provide services different from 4G except for being faster. Another concern will be the time lag between 5G related services. They could take years before being fully commercialized. The delay is critical as communication technology has a relatively short life. Another major difficulty facing the implementation of 5G technology is its potential for creating a further digital divide as it will first be launched in areas where demand will be higher, therefore rural areas might be left out. Devices which are compatible with 5G will be critical for creating user demand. Net neutrality will also be an issue in the success of the technology (ITU, 2018).

7. CHALLENGES FOR THE INDIAN MOBILE SERVICE INDUSTRY

The number of service providers currently providing service in India is steadily growing. Airtel India being the largest mobile telecommunications network provider, on the other hand, Vodafone India and Idea Cellular have been merging to form to take Airtel's place as the largest telecom company in India. While Reliance Jio Infocomm Ltd. is India's largest 4G network provider. Currently, it is working on offering services in 5G and 6G services.

Along with the opportunities in the mobile industry, there are also several challenges that need to be overcome. The problems that are being faced by the world mobile industry are also being faced by the Indian industry. These problems can be summarized as:

- a) Stagnation in new acquisition
- b) Declining Revenue
- b) Retaining existing customer base
- c) Removing Digital disparity between developed and developing/Urban and Rural areas
- d) Search for new source of revenue other than the traditional voice/data
- e) Competitive Pricing
- e) 5G Implementation

It can be inferred that the breathtaking developments that were witnessed by the industry in the first two decades of 21st century have slowed down or become stagnant. The saturation in the new acquisition, switching to a competitor, and the declining revenue are creating viability pressure on the operators. The fees and the taxes being charged by the government are further increasing the load on financial performance. The mobile industry at the moment appears to be in a growth deadlock.

The whole industry is putting their hopes in 5G to break the deadlock. The high speed 5G enabled data services can rejuvenate acquisition. Higher data usage and the variety of applications developed due to 5G for households and enterprises can bolster the sagging revenues. Testing for 5G by different operators is going on. Even the government is

Table 2: List of Cellular Mobile Service Providers currently providing service in India (31-12-2021)

S.No.	Service Provider	Area of Operation
1.	Bharti Airtel Ltd.	All India
2.	Reliance Communications/ Reliance Telecom Ltd.	All India(except Assam & North East)/ Kolkata, Madhya Pradesh, West Bengal, Himachal Pradesh, Bihar, Odisha, Assam & North East
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: Telecom Regulatory Authority of India Yearly Performance Indicators Indian Telecom Sector (Sixth Edition) 2021

banking heavily on 5G to create economic development and evolve a more wholesome financial inclusion of all the sections of society. But presently India is still struggling to improve the quality of its 4G services and is investing in its upgradation. The 4G technologies have been more readily accepted by the urban society than the rural population. The affordability and digital skills pose a big barrier to their adoption. The challenges in the roll out of 5G at global level are true for India too. The financial health of the industry raises questions about the ability of the operators to invest in the new technology. India's rural majority with its slow adoption of the existing technologies, cost and availability of the 5G enabled handset and all other technical challenges raise doubts about the success and adoption of 5G.

8. CONCLUSION

Demographic testing of the model is the future scope of the present study. The present study did not show any important influence on Mobile Anxiety, Perceived External Control, and Subjective Norms, yet their related antecedents have shown significant influence. A direct relationship between Government Support and Perceived Ease of Use as well as Perceived Security and Perceived Ease of Use can be tested. Similarly, a direct effect of Network Externality on Perceived Usefulness can be another future scope of the study. It may also be possible to test the concept in upcoming related research areas such as smart speakers, smart homes, smart wearables, and entertainment streaming apps. The model can also be used to study the adoption of upcoming mobile technology such as 5G. ●

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