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Prospects and Challenges of Telecom Sector and 5G Service in Indian Market

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ABSTRACT
The adoption of mobile services is being studied using a wide range of ideas. Because of this, many models and a wide range of adoption-affecting factors have been used to envision how quickly and widely mobile services would be adopted. As a result, the idea of adopting mobile services is currently, at best, chaotic and convoluted. The sector is experiencing stagnant customer demand and revenue, and all the expectations for a recovery are centred on 5G. Due to these characteristics, the Indian market, which is currently among the biggest and fastest-growing, is also facing a number of difficulties. Problems include a stagnant client base and revenue, fierce competition, low customer retention, and disparities between urban and rural areas. All interested parties will benefit from a concept that can succinctly characterise the adoption of mobile services for all types of services and be used globally, especially in the Indian context.

Keywords**:** *5g, wireless, wireline, requirement, future, advancement, telecom*

I. INTRODUCTION

In India, telecommunication was introduced by the British. The government granted a licence to the English company Oriental Telephone Company Limited in 1881 for telephone exchanges in Kolkata, Mumbai, Chennai, and Ahmadabad. With 93 subscribers, a central exchange was soon established in Kolkata. Another exchange began operating in Mumbai in 1887. Both the telephone and the telegraph were viewed as instruments of control and systems for upholding law and order. To further bolster control, the telephone, telegraph, and postal systems were all merged. The Indo-European Telegraph Department was finally combined with the Indian Telegraph Department and given the new name of Overseas Communication. The Post Office and Telegraph Department began to co-develop under the Post and Telegraph Department. The Indian Radio Telegraph Company (IRT) was established in 1923. The telecom services were intended to be operated on a nonprofit basis from the start. This was to be India's policy once it gained independence.

After the country gained its independence, all of the foreign telecommunications firms were nationalised to form Postal, Telegraph, and Telephone (PTT), a monopoly that is controlled by the government and is governed by the ministry of communication. It encompassed all of the telephone and telegraph networks, as well as those that were present in the former princely states. The Department of Telecommunications (DoT) was founded in 1985. It provided domestic and international telecommunication services alone. Additionally, it served as its own regulator (Mukherji, 2009). [1]

The government started Telecom as a government-controlled monopoly with the intention of giving the nation a modern communications infrastructure by exploiting the already-existing telegraph network and extending the currently-existing telephone lines. Indian consumers did not have a choice in service or control over its quality for a very long time. The performance of the telecommunications industry was dismal until the middle of the 1980s, when it began to function as a slow-moving, overworked government apparatus with the ministry's approval. The waiting list for phones was around 1 million by the middle of the 1980s, and it increased to 3 million by the 1990s. Due to the circumstances, there was widespread bribery and corruption. 350 million people were served by 84,000 lines when India became independent. The connections expanded to 2.5 million lines by the 1980s, serving a population of 700 million. Only 3% of the 6,00,000 communities had telephone connections. India's telecom industry was plagued by exorbitantly low teledensity, deteriorating infrastructure, a limited range of services, a highly bureaucratic organisation, and expensive tariff rates (Prasad, 2008). [12]

II. TELECOM LIBERALIZATION

DoT was established in 1985 to offer local and long-distance telephone services in an effort to enhance telecommunications services and lessen governmental influence. But by combining the functions of a policymaker, regulator, and service provider under the DoT, the monopoly was only strengthened (Mukherji, 2009). It was in charge of creating telecom policies for quick growth. It was highly inclined to influence the regulations in favour of government-owned telecom businesses as a policy maker, regulator, and service provider (Mukherji, 2009).

In order to speed up the sluggish development of telecommunication in India, the parliament established a committee in 1981 to conduct an extensive examination of the telecom environment and submit recommendations for network improvement (Vercruysse, 1990). [2] Rajiv Gandhi, the then-prime minister, actively promoted the information revolution while in office from 1984 to 1989, which helped increase the policy focus on telecommunications. The electronic sector's contribution to modernization was growing. To enhance telecommunications services, a "Mission Better Telecom" with a very ambitious goal for the year 2000 was established at that time (Vercruysse, 1990). The process of liberalising the telecom industry was therefore launched. Telecom became a priority for the country as a result of the Seventh National Plan (Nayak& Maclean, 2013).

In order to lessen the role of the government in managing telecom services and to make money from their offerings, MTNL and VSNL were founded (Vercruysse, 1990). With the entry of private firms in the production of telecom equipment and the corporatization of telecom with MTNL and VSNL, historical efforts to liberalise the telecom sector started in the 1980s (Vercruysse, 1990). In 1984, Sam Pitroda, a significant government protégé, established the Center for Development of Telematics. It was a free-standing organisation founded with a focus on telecom research and development. In addition to eliminating the governmental monopoly in rural enterprise and equipment production, it was effective in bringing digital fixed line exchanges suitable for Indian conditions (Nayak& Maclean, 2013).

According to Kapil Kumar's (2017) observation, all operators should strive to claim a piece of the whole data market space. The following difficulties that operators must overcome in order to accomplish this are: technology to enable faster connections and availability through new compression and other techniques; developing more innovative and interesting applications for user-friendly use. The government and regulators (TRAI) must provide the appropriate mix of policies to help make all of this happen, and all stakeholders, including operators, phone manufacturers, software and application developers, must contribute to the infrastructure throughout the ECHO system.

The Indian economy now includes the telecommunications industry, according to research by AnandDeo (2017). Even though the industry is subject to strict regulations, recent government initiatives are giving this sector significant growth prospects through lower spectrum fees and flexible rate structures. Given the escalating cost, the financial strain on the telecom industry's crippled debt, and the intensifying competition in the wake of Reliance JioInfocomm Ltd.'s debut, it was anticipated that telecom companies would refrain from submitting bids for the band. Significant investments in 4G infrastructure, lack of telecom infrastructure in semi-rural and rural areas, pressure on margins from stiff competition, rapidly falling ARPU (average revenue per user), delays in the rollout of new products and services, limited spectrum availability, and low broadband penetration are some of the problems.

According to research by Vani Kola et al. (2018), in the most developed markets, telecom providers make 50% more money from data than voice (20% of total income). It appears that during the next three to four years, the distribution's balance will change and data will become a significant contributor to the top line. According to estimates, 500 million users will use an average of 10GB of data each month, up from 120 million customers who used 1GB on average per month in 2016.

Table 1: India's Total Number of Telecom Subscribers as of December 31, 2021

Telecom Subscribers (Wireline+ Wireless)	
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%
Wireline Subscribers	
Total Wireless Subscribers	23.79 Million
% Change over the previous year	18.63
Urban Subscriber	21.86 Million
Rural Subscribers	01.93 Million
Market Share of Private Operators	56.50%
Market Share of PSU Operators	43.50%
Wireless Subscribers	
Total Wireless Subscribers	1,154,62 Million
% Change over the previous year	0.07
Rural Subscribers	521.28 Million
Urban Subscriber	633. 34 Million
Market Share of Private Operators	89.81%
Market Share of PSU Operators	10.19%
Broadband Subscribers/Internet	
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
Rural Internet Subscribers	333.10 Million
Urban Internet Subscribers	496.20 Million
Total Internet Subscribers per 100 population	60.46
Rural Internet Subscribers per 100 population	37.25
Urban Internet Subscribers per 100 population	103.95

Source: India's Telecom Regulatory Authority Indian Telecom Sector Annual Performance Indicators, Sixth Edition, 2021

III. THE CASE OF 5G AND 5G'S IMPACT ON USERS

Steam and mechanisation, followed by electricity and mass manufacturing, served as the foundation for the first two industrial revolutions. Electronics, information technology, and automation were all part of the third revolution. According to predictions, the fourth revolution will build on the third but have a much bigger impact. It will be disruptive and change governance, management, and production. It will link billions of users to smart gadgets with limitless computing power and be enhanced by advancements in robotics, artificial intelligence (AI), and a variety of other applications. It will be possible thanks to 5G technology (Gupta et al., 2018).

Over 50 nations will roll out 5G services as the world moves from 5G experiments to commercialization. It is occurring earlier than anticipated in certain nations, including the US, China, Australia, and some Gulf nations (GSMA Intelligence, Report 2019). By the end of 2022, India may make its debut. According to Frias& Martinez (2018) and GSMA Intelligence (Report 2019), 5G is anticipated to develop new revenue streams, competitive drivers, and market opportunities. India has high expectations for 5G, from its operators to its government, as a tool for the economic and social inclusion of all societal segments throughout the country. Additionally, it can facilitate the expansion of IT in the commercial, academic, medical, agricultural, financial, and social sectors (GSMA Intelligence, Report 2019).

The fifth generation of telecommunications technology is known as "5G." There will be no restrictions on fully wireless communication (Suhail, 2019). It is regarded by the telecom sector as LTE's successor and will be significant for the Internet of Things. [2] There are several technologies that could be used for 5G, rather than a single one. To support the anticipated traffic boom, it will utilise higher frequency bands. It must fulfil a number of conditions in order to live up to all expectations for 5G. The demands that must be satisfied by the new technology include increased traffic capacity, increased data rate, huge device connectivity, decreased latency to accommodate augmented reality and M2M usage, energy conservation, and cost reduction. The technology that supports 5G, such as Software Defined Networks (SDN) and Network Function Virtualization (NFV), will give it flexibility, elasticity, and scalability (Frias& Martinez, 2017). Due to its widespread use, 5G is considered the most disruptive technology (Gupta et al., 2018).

With integrated low latency and ultra-reliable capabilities, 5G will offer an ultrafast broadband experience (Frias& Martinez, 2017). In the end, it's a chance to empower both enterprises and citizens. It will make cities "smart" and enable inhabitants to profit from the socioeconomic advantages brought forth by the sophisticated, data-intensive, digital economy (ITU, 2018). The IoT and Internet of Vehicles, mobile cloud computing, smart grids, big data, and device-to-device communication are some of the areas where the new technology may have an impact. The following are some of the services that 5G is expected to enable:

- Broadcasting Large Data at High Speed and Capacity in GBPS
- Emergency/Disaster Systems with UHD Video Streaming and Downloading
- Augmented reality for vehicle-to-vehicle and machine-to-machine communication
- Automation in Industry
- Mission-critical applications, such as health care that is based on a person's age, income, caste, community, job, education, spending, employment, etc.

IV. PRESENT DIFFICULTY WITH 5G

Policymakers and the industry may proceed cautiously with 5G technology until the results and benefits become more apparent and then concentrate on improving the 4G network (Forge & Blackman, 2017; ITU, 2018). 5G technology demands significant investment. The technology has not been tested for commercial viability. A fair assessment of the needs of the company and of the individual customers has not been made. [1] We have not assessed whether they would be willing to pay for 5G-equipped services. (Forge & Blackman, 2017; GSMA Intelligence, 2019). It is essentially an optimistic scenario. It is a new technology with unknown uses and a hazy demand.

The efficient implementation of 5G is also hampered by some other technological issues, including spectrum with higher frequency bands, signal attenuation, and penetration of solid materials without losses (Al-Falahy&Alani, 2017). With the exception of being quicker, 5G in its early phases will offer services similar to those of 4G. The delay in 5G-related services will be another issue. Before becoming completely commercialised, it can take years. In light of the relatively short lifespan of communication technology, the delay is crucial. Another significant challenge in implementing 5G technology is the potential for it to widen the digital divide because it will likely be introduced first in urban areas where demand will be highest, leaving rural areas out. In order to generate user demand, 5G-compatible devices will be essential. A problem for the technology's success will also be net neutrality (ITU, 2018). [3] [4]

4.1 Difficulties Facing the Indian Mobile Service Industry

In India, there are currently an increasing number of service providers. The largest mobile telecommunications network provider in India is Airtel; however, Vodafone India and Idea Cellular have been merging to overtake Airtel as the country's biggest telecom provider. The largest 4G network operator in India is Reliance JioInfocomm Ltd. It is currently developing services for 5G and 6G networks. [5]

The mobile industry offers many opportunities, but it also presents a number of difficulties that must be overcome. The Indian mobile industry is experiencing the same issues as the global mobile sector. These issues can be summed up as follows: a) New acquisitions in stages

- Reduced Revenue
- Preserving the current clientele
- Eliminating the digital divide between developed and developing countries and urban and rural locations
- Look for additional revenue sources outside of the customary voice and data sources.
- Reasonable Prices
- Implementation of 5G

It can be assumed that the industry's breath-taking advancements from the first two decades of the twenty-first century have slowed down or reached a standstill. Operators are facing viability pressure due to saturation in the new acquisition, migration

to a rival, and diminishing revenue. The burden on financial performance is further increased by the fees and taxes levied by the government. The mobile market currently seems to be at a standstill in terms of growth. [6]

The entire industry is counting on 5G to end the impasse. The high-speed data services made possible by 5G can revitalise acquisition. Increased data usage and the diversity of applications created as a result of 5G for consumers and businesses can boost declining profits. Different operators are conducting 5G testing. Even the government is placing a lot of faith in 5G to spur economic growth and advance a more healthy financial inclusion of all societal segments.

Table 2: List of Indian Cellular Mobile Service Providers Currently in Operation (31-12-2021)

S.No.	Service Provider	Area of Operation
1	BhartiAirtel Ltd.	All India
2	Reliance Communications/ Reliance Telecom Ltd.	All India(except Assam & North East)/ Reliance Telecom Ltd. 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 JioInfocom Ltd.	All India

Source: India's Telecom Regulatory Authority Indian Telecom Sector Annual Performance Indicators, Sixth Edition, 2021

However, India is now still working to upgrade its 4G services and is investing in their improvement. The urban society has adopted 4G technologies more quickly than the rural population has. The cost and lack of digital skills are major obstacles to their implementation. The difficulties with the global rollout of 5G apply to India as well. The industry's financial stability raises concerns about the ability of the operators to make investments in cutting-edge technology. India's rural people have been slow to adopt existing technologies, 5G-enabled smartphones are expensive and hard to find, and there are other technical problems that make it hard to know if 5G will work and if people will use it. [7]

V. CONCLUSION

The future focus of the current study will be on the demographic testing of the model. Mobile anxiety, perceived external control, and subjective norms did not appear to be significantly impacted by the current investigation, although their linked antecedents were. It is possible to test a direct link between perceived security and perceived ease of use, as well as between perceived security and perceived ease of use. Another potential future area of study is the direct impact of network externality on perceived usefulness. Future research in areas like smart speakers, smart homes, smart wearables, and entertainment streaming apps may also allow for the testing of the idea. Future mobile technology adoption, such as 5G, can be studied using the model.

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