Feasibility And Viability Analysis Of Enhancement Of Mobile Spectrums (With Special Reference to 2G, 3G, 4G and Proposed 5G)

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ABSTRACT: *The growth of telecommunication leads to the economic growth in manifold for the country. In recent years when the user's demand has changed significantly, the composition and structure of telecommunication industry has also changed a lot. It directly contributes in GDP, Government Revenue, and Employment, by lowering transaction costs, by providing faster access of information; it improved various services like health care, education, banking, insurance aviation, transport and other sub sectors of the economy.*

On the other hand, it has forward and backward linkage with mainly Data Intensive Industries, IT hardware and software, electronic equipment industry, and infrastructure industry etc. Change in technology and user's demands at micro and macro levels have also brought technological advancement in the telecommunication industry. Therefore, enhancement of mobile spectrum from 2G to 3G, 4G and beyond has created various opportunities and threats to different economic, social and technical segments.

The present study is an attempt to examine the mobile feasibility of spectrum enhancement from multi dimensional aspects. The study will also focus on present and future challenges of this sector.

Keywords: Industries Spectrum, Secondary Trading, Mobile Eco System, Data Intensive

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1. Introduction

The Telecom industry has experienced humungous changes in the last decade: from 15% in 1999 to 70% in 2009 of people had access to telephone. Telecom sector is improving day by day. We can say that in the coming years the telecom sector is going to increase very rapidly because the industry is developing at a faster rate. The global revenue of the telecommunication industry has reached $2.1 trillion in 2012 with an expectation of a rise to $2.7 trillion by 2017.

As per the report of GSM Association on developing markets, during 2008-2011, 10% shift from 2G to 3G, the GDP growth increment of 0.15% was observed. The main parameters on which the telecom sector affects the GDP of India are:
• Tele density.

• Market Penetration.

• Innovations (You can say that, if innovation in this area is more, teledensity will be more).

• Policies made by the Government

• Mobile Data Consumption.

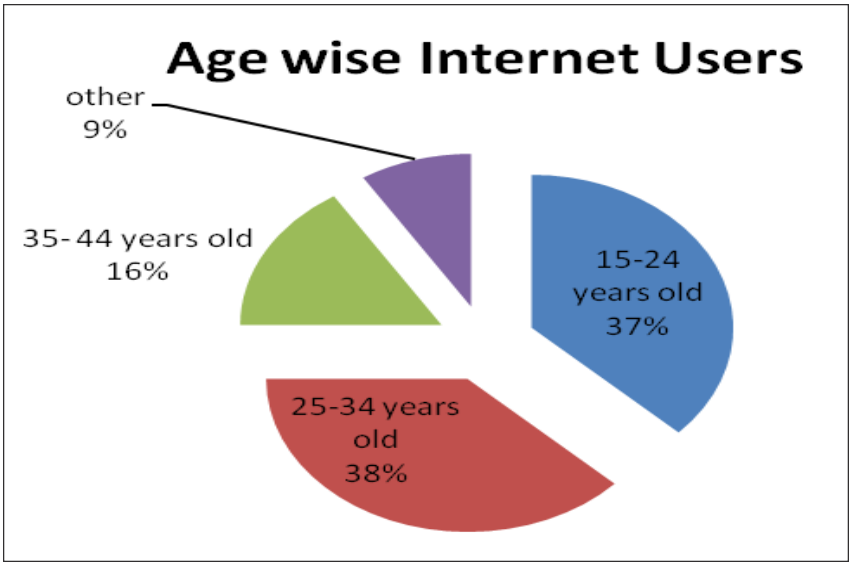
Efficient spectrum must include right amount of allocation to specific classes of users, assignment of usage rights and adjustment of established policies as technology and market evolves overtime. (Bauer 2008). Now due to change in customer's preferences (retail and institutional), the service provider has to change the spectrum usage assignment to optimize the cost and profit ratio.

Govt. of India invested Rs 7000 crores for high speed wifi in country over the next three years. (Government of India has invested a huge amount to supply 2500 cities and towns with high speed wifi and government areas such as railway station , hospitals etc.). Govt. has now allowed 100% FDI in the telecom sector. Union cabinet of India invested Rs 64,840 crores for the largest ever telecom auction.

This trend may continue as the consumers in this industry are continuously multiplying. It is predicted that India will have the largest number of internet users by 2025 according to a Microsoft report.

Migration is taking place rapidly from 2G to 3G/4G year over year; therefore many service providers are maintaining all three levels of spectrums. Presently the penetration of 2G is decreasing gradually worldwide replaced by 3G/4G. The pace of migration is so fast that while 3G took about 10 years to reach out to half of the population whereas 4G will get the same milestone in nearly 8 years in context to India. The migration and current multiple level of network like 2G, 3G and 4G involves huge capital and operating cost to serve all types of customers. As per the Mobile Economy (2015) GSMA, Low level of technical awareness about spectrum enhancement creates a lot of challenges because the capable buyer has little knowledge of all these operations due to age and other factors while technically sound youngsters who love to enjoy higher spectrum but are not so financially sound because of their high financial dependence on their parents. However, US and European countries people start earning at their younger age and enjoy the benefits of higher spectrum. However, at the global level, less than 2G expected percentage of covered population is always higher than the percentage covered under 3G/4G.

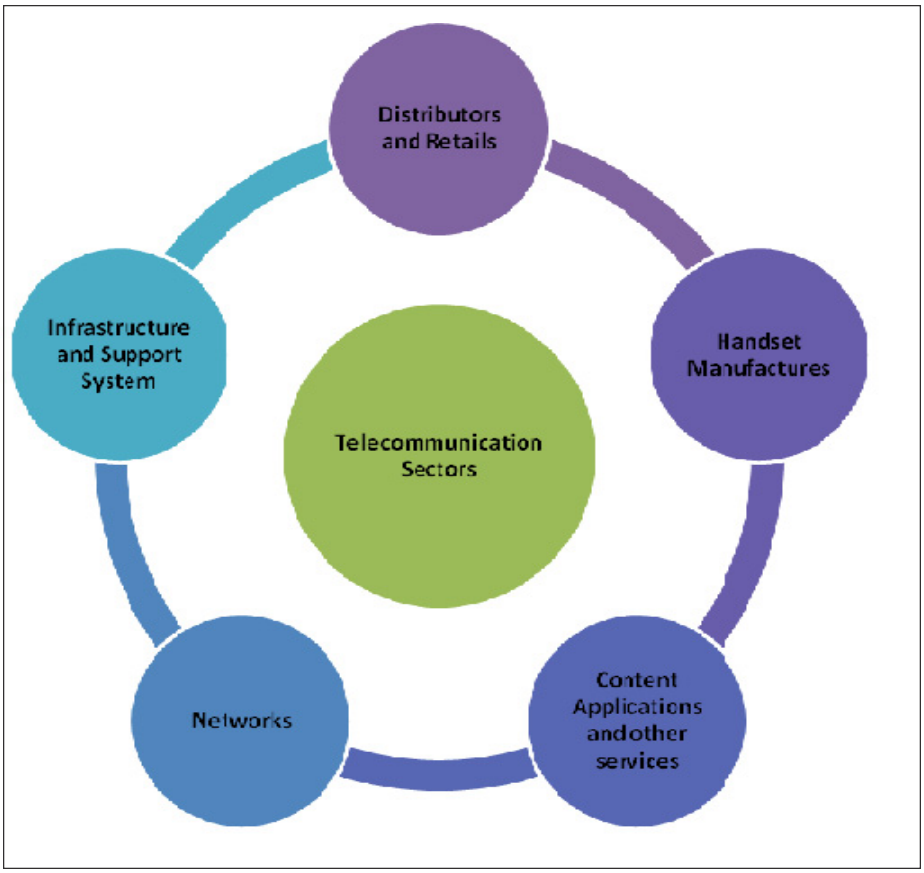
Graph.1



Source: PWC report on e Commerce in India Accelerating growth February 2015.

As shown in the above graph of age wise internet users, it is very clear that majority of the users (75%) belongs to the age up to 34 years. In the past 10 years, the various factors affecting our modes of communication have improved dramatically. Better networking and computing, faster connections, cheaper costs, etc., all would have been impossible without this renaissance of technology.

The industry also has forward and backward linkage with other industries as depicted in following graph. And the results are clearly visible. The numbers of mobile users have grown by an exorbitant 1800 % from 2004 to 2014. In the current scenario of Indian telecom industry, it is a matter of pride for us that the Telecom industry of India is the second largest emerging economies of the world, only next to China.



Graph#2

The innovative GSM and CDMA services have been a revolution in the telecom sector, but it's the 4G LTE (Long Term Evolution) that is creating the buzz. Considering about the impact of the recent technological changes in the telecom industry, following are the impacts observed –

- Increasing speed of networks.
- Movement towards the digital technology
- Development of mobile technology.

Review of Literature

Do Van, Do H. and Chakka, 2012, model spectrum renting policies and call admission to control the spectrum wastage in a realistic manner. Queuing model incorporates exponentially distributed call duration to evaluate the performance of mobile cellular network. Spectrum users use renting of unused spectrum for its efficient use. The study has taken modelling assumptions for regression analysis to find out relationship between number of rented frequencies and number of available channels. LFGC, QUFGC and UFGC are compared with renting options and without renting options. The study shows that variants of Fractional Guard Channel policy makes efficient tools to guarantee and enhance the grade of service handover calls.

Hwang and Yoon, 2009, explain that because of scarcity of spectrum and increase in the value of spectrum, its efficient

management became more complex. Every approach is blended with its advantages and disadvantages, therefore, the present study shows current situation and propose mixed strategy for efficient spectrum in Korea. With little role of market forces, Korean policy makers believe in command and control concept. The present study has examined the various attributes which are dependent on technology, survey characteristics and wireless communication market. It addresses issues related to property rights approach by allowing secondary trading, unlicensed approach and spectrum sharing approach with international trends by comparing all approaches SINR Utility Function Model and Welfare Model. It also presents scenario description, parameter description with results depending on market condition. To take final decision, mixed regime was adopted by allowing secondary use (secondary trading and opportunistic use) and unlicensed use. The study concludes with certain assumptions that some countries are developing midterm spectrum framework.

Jho, 2007, presents a case of standardization in telecommunication in Korea. It also highlights the linkage between technological development and its benefits with sense of understanding of the government to make it migration to 2G and 3G networks after understanding of market forces by the state actor and it becomes a very relevant factor. Collective impacts of political, social, economic and technical variables influence the government to take the decision of technology standardization. The study focuses that how the Korean government worked on its agenda by satisfying diverse stake holder and other market actors. To continue with CDMA was easy for the government because it was well equipped with infrastructure support and seemed financially viable scheme for average consumer. Failure of upgradation of CDMA technology to dominate global standards, the government was forced to pay huge loyalty to Qualcomm. So, it could adopt standard policies for evaluation of communication system.

Yan, 2004, describes issues and challenges while adopting 3G licensing in Hong Kong. The study examines the impact of Hong Kong's 3G license schemes on licensing policies and ancillary industries. The government mainly faced issues like choice of technical standards including dual mode design network of 3G terminals to enable backward compatibility with 2G networks, allocation of ratio spectrums like migration issue from 2G network to 3G network, assignment of 2G spectrum and auction of 3G spectrum. In Europe and U.K., the government generated huge license fees through 3G spectrum auction, but due to negative reaction on stock exchange again it brought down the license fees. The government adopted annual royalty payment auction with minimum guaranteed payment which caused breakeven to the carrier companies after first 5 years. Up to some extent the Hong Kong 3G spectrum auction maintained the balance between spectrum efficiency and market competition.

Bykowsky, 2003, discusses the steps to enhance market liquidity by secondary trading of spectrums. The transaction and other costs could be reduced in the presence of central brokers. Secondary trading also exposes liquidity risks and performance risks. The efficiency of secondary market will be dependent to minimize transaction cost and maximize trader's surplus. The point at which demand and supply intersect is termed as market clearing price. The difference in the two bids reflects premium fromseller's side. An electronic call market can enhance market liquidity and can be designed to incorporate call option.

Hazlett and Muñoz, 2006, study the relationship between spectrum policy and efficiency in output market. The price system is mainly based on the following 3 parameters like Beauty Contest, Saving the cost of re-assignment and generation of revenues for public use. It discriminates among spectrum allocation, license assignment and retail market. Spectrum license created and market structure rules come under spectrum allocation, license assignment includes auction rules and retail market comprises of prices, output and tax savings. The study intends to allocate spectrum to promote the most efficient delivery of wireless services to assign licenses that maximises social values and and minimize the present value of payments to the government.

Objectives of the Study

- To assess the GDP contribution of telecommunication.
- To examine the usage of telephone services.
- To Understand the impact of spectrum enhancement on telecom industry

Research Methodology

The study is an exploratory research to find out relationship between spectrum enhancement and economic growth along with technical advancement. The study will be based on secondary data collected through various published reports, and relevant articles and other historical data.

Data Analysis

As far as the feasibility growth of telecommunication industry we need to find multidimensional approach, which should include following aspects

• Technical Viability

• Financial Feasibility

• Socio economic analysis

Technical Viability

Technical viability is very crucial for any business, as it is forced to fail if a business does not meet its technical viability. It also establishes backward and forward linkage with ancillary industries. With the help of following graph, forward and backward linkage of various industries can be explained, which directly affect telecommunication. These ancillary businesses check the technical suitability of business.

Financial Feasibility

It takes into account various financial and economic indicators like GDP growth, Production and Industrial Growth supplier and customer end industries etc.

Socio Economic Analysis

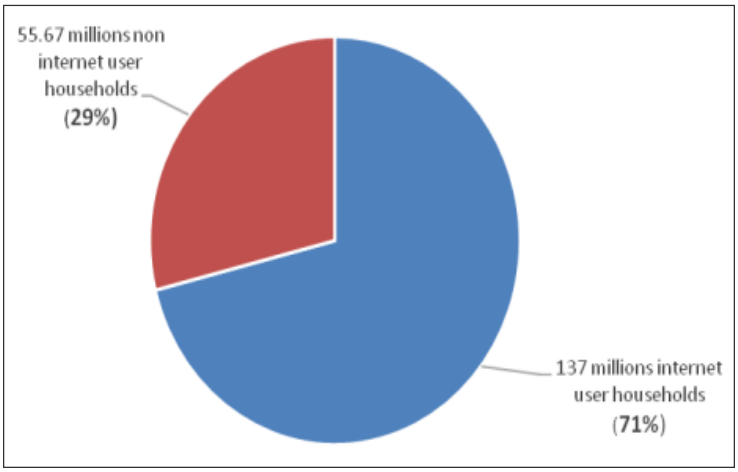
Socio economic analysis represents social cost benefit analysis. In case of telecommunications, the mobile tower generates a significant radiations, as well as all the mobile sets and other electronic devices which are needed in this business consumes significant amount of power and energy as well as emits out inefficiency.

Therefore, there is a need to analyze the industry growth in the light of input and output reference. For better understanding, we should know the Input and Output components for Data Envelopment Analysis

Equation: Input = Desirable Output + Undesirable Output

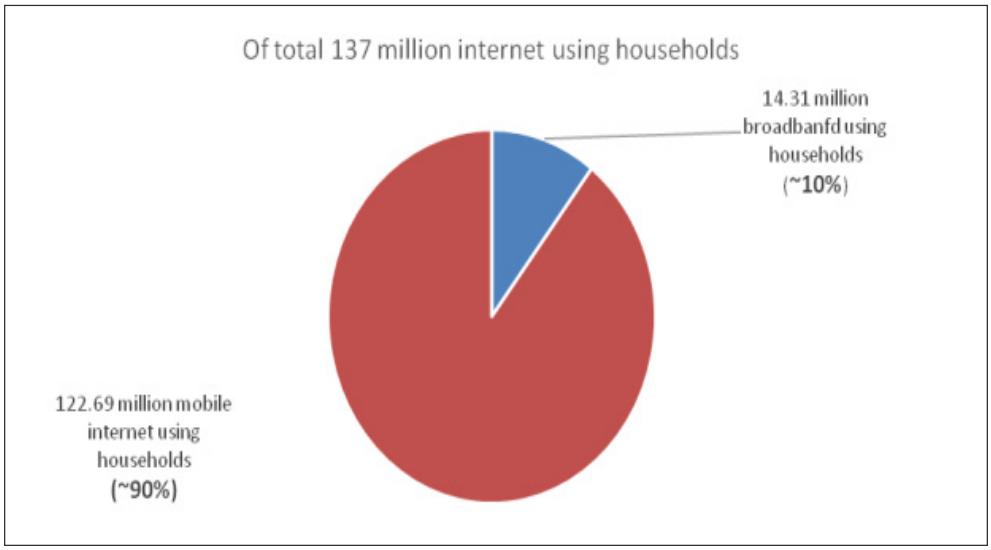
Input	Desirable Output	Undesirable Output
Infrastructure	Employment of Skilled Labour	Health danger (radiations, skin effects, effects on eyes and deterioration of bone density etc)
Capital Expenditure (License Fees, etc)	Speedy transactions of data	
Operating Expenditure (Power, etc)	Faster and Real Time Based Communication	
	Machine to Machine (M2M) Business	

When assessing global presence of mobile and internet connections, it has been observed the population of internet users is far more than non users as shown in the following graph#3.



Graph 3

Further the access point of internet needs to be discussed, which is clearly visible from the following graph that only about 10% population uses broadband services.



Graph 4

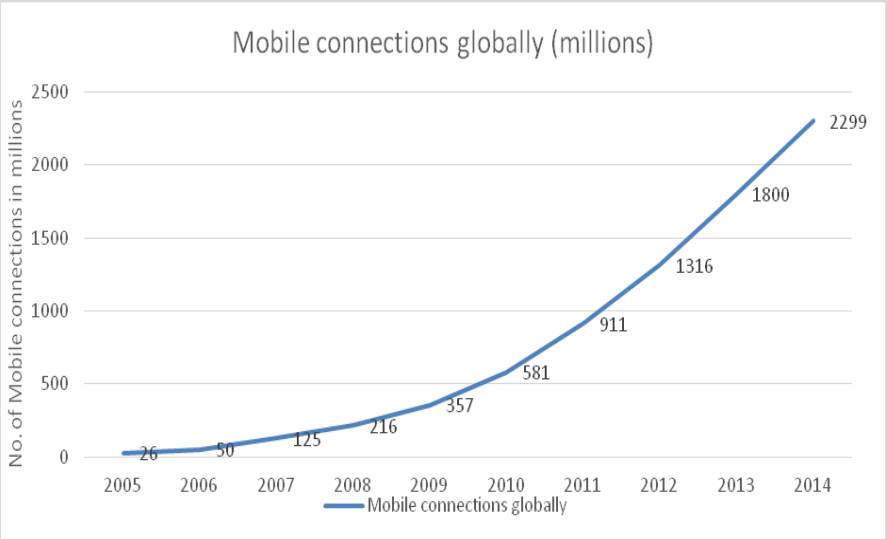
However, it is also clearly visible (As depicted in graph#4) that the number of mobile connections has grown tremendously in the last decade, which was the main reason of increase in the demand of 3G and 4G services.

Not only mobile connections have increased, but this growth has also been translated into revenue. As shown in the following graph #5, that global revenue of telecom sectors has increased from 851 Euros to 1216 Euros in last decade.

Because of the improving network technology, the number of subscribers have reached 77.56% on the completion of the year 2014 which has an increase of 14.58% from 62.98% in year 2000.

The proportion of population using the internet is increasing at tremendous rate. Especially due to the fact that the number of ISP are increasing in the country and the access is now easy and cheap.

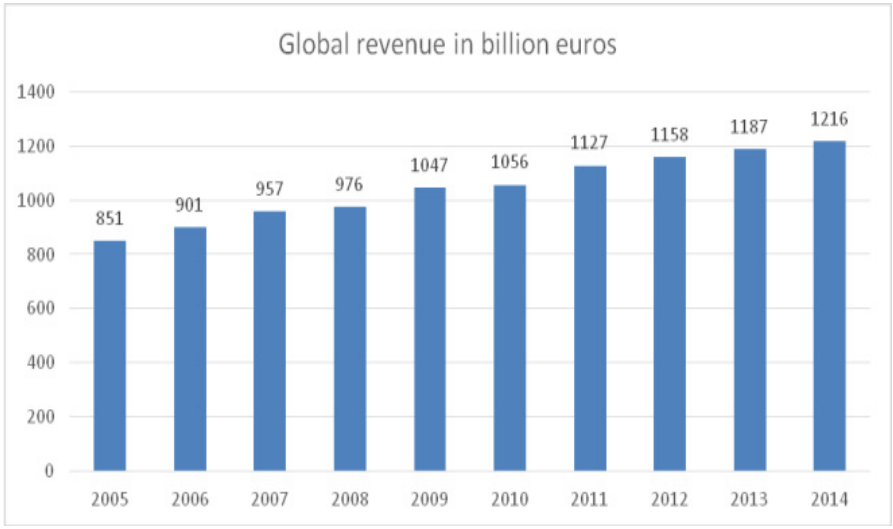
According to TRAI, Total revenue generated in 2014 was around USD 33,350 million. Total telecom subscribers were recorded as 970.97 million. Interestingly, the number of fixed line subscribers is mere 27 million, about 2.78 %. While rest is accounted by the mobile subs. Monthly telephone additions sum up to 5.8 million. Around 10.2% of all Indian households have access to



Graph 5

internet, which is 137 million households. Of these 137 million, 14.31 million or 1.18 % have broadband internet.

As far as internet penetration is concerned, India is lagging far behind from other countries. As per the India@digital.bharat, 2015, in 2014 the India's internet penetration was 19% in comparison to 50% in China, 54% in Brazil, 61% Russia. As far as urban and rural distribution is concerned it is estimated that 216 million urban and 138 million rural populations will be using internet in June 2015.



Graph 6

• Total of 285.35 million subscribers in India's GSM network as of January 2014.

• Data traffic by 3G (third generation) services increased by 46% during 2013.

• Smartphone market has grown by 71% in 2013.

Findings

The great leap in tele-density from 3.58% to 74% (March 2001 – June 2013) marks a leap in the number of consumers along with revenues (from telecom services). This contributed sufficiently to the GDP growth and also provided employment to the youth (which was well needed). The employment in communications sector has reached 10.3 million in 5 years and by the end of 2015,

it is expected to be one of the top growth drivers of economy with a 15.4% share of GDP (equivalent to Rs. 865,031 cr). Now a days the major problem that telecoms industry is facing is competition, due to this increase in competition the investors and the consumers are really pulling their legs out of this industry.

Conclusion

To improve the telecom industry further so that it contributes more towards the GDP, more concern should be laid on how to improve market penetration in rural India as even today most of India lies in villages. Seeing the current trends of investment and business done in Telecom sector, it seems to be a sector of great opportunity and growth. With coming of age technology, communication has become fast and efficient like never before. It continues to fulfill demands of the people and will continue to do so.

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