MAKE IN INDIA IN THE FIELD OF TELECOMMUNICATION

A Dissertation submitted to the Panjab University, Chandigarh for the award of the degree of Master of Philosophy in Social Sciences, in partial fulfilment of the requirement for the Advanced Professional Programme in Public Administration

by

MANOJ KUMAR

(Roll No 4821)

Under the guidance and supervision of

PROF. ASHOK VISHANDASS

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CERTIFICATE

I have the pleasure to certify that Shri **Manoj Kumar,** has pursued his research work and prepared the present dissertation titled, **Make in India in the field of Telecommunication**, under my guidance and supervision. The same is the result of research done by him and to the best of my knowledge; no part of the same has been part of any monograph, dissertation or book earlier. This is being submitted to the Panjab University, Chandigarh, for the purpose of Master of Philosophy in Social Sciences in partial fulfillment of the requirement for the Advanced Professional Programme in Public Administration (APPPA) of Indian Institute of Public Administration (IIPA), New Delhi.

I recommend that the dissertation of Shri **Manoj Kumar** is worthy of consideration for the award of M. Phil degree of the Panjab University, Chandigarh.

Date: 3 April, 2023 **Prof. Ashok Vishandass**

Place: New Delhi

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Date: 3 April, 2023 **(Manoj Kumar)**
Roll - 4821

IIPA, New Delhi

ABSTRACT

Telecom sector in India is going through a booming phase and the sector is playing an important role in infrastructure growth, economy, and social set up change of the country. The sector requires multiple series of telecom network equipment and demand for this equipment is going up year on year. Most of this equipment, mainly critical technical equipment is getting imported or manufactured by global suppliers having origin outside India with substantial foreign exchange outflow and whatsoever is being manufactured is having very low value addition to country's economy .Due to rapid evolution of the telecom sector, growing stress on its revenues, and network expansion with new technologies, industry did not consider indigenisation of the network equipment in the past. The Govt has now responded to this situation by attempting to make India a manufacturing hub for telecommunications equipment through various schemes under Make in India initiatives . The core purpose of the study is to review telecom sectors' manufacturing scenario, its challenges, and propose suggestions to improve upon scenario.

Make in India initiatives in Telecommunication have been started to indigenize booming IT and Telecom Sector with the view to generate employment, increase FDI and make India a manufacturing hub of ICT products.. The national program is designed to facilitate investment by eliminating red-tapeism, promoting innovation by major bureaucratic reforms, deregulations and public-private partnerships. It targets to build best-in-class manufacturing infrastructure and enhance skill development so as to create environment favourable to that of setting up of business ventures in India .Although there is evidence of increased domestic production, the surging demand has necessitated imports of Telecom equipment . The value added by domestic manufacturing is still very low, but is likely to increase as the scale of domestic manufacturing increases in Telecom sector. The study is an attempt to capture the changing scenario of manufacturing sector the telecommunication industry of India with Make in India initiatives . The study also tries to unravel the change strategies adopted by the key players in the industry. . The dream of making India a global manufacturing hub, though, sounds very rosy but is full of challenges and roadblocks. There are a number of obstructions which the government will have to resolve before it can hope to achieve its dream of making India a global manufacturing hub

. Literature Review has revealed that no cumulative study has been done so far, which elucidates the initiatives concept, relevance, achievements and bottlenecks all in one single study because initiatives of Make in India In Telecommunication like Production and Design Linked Schemes and Preferential Market Access still require few more years to give the desired result and other projects like Manufacturing and designing in semiconductor field are still in initial stages and there is not much data available for Industry specific implication of Make in India in particular sector of economy like employment generation.

The study finds that to make India manufacturing hub India needs to take steps for strengthening of Infra structure facilities and changing policies for ease of doing business for attracting FDI , initiate Productivity Linked and Design linked scheme to encouraging Telecom Manufacturers for domestic manufacturing , strengthening R&D sectors and IPR creations , to encourage Preferential Market access for Public Procurement – Preference to Make in India for deployment of Domestic Telecom products in Govt sector, Other Financial / Tax incentives to private Telecom service Providers for deployment of domestic telecom gears, proper insurance/credit policy for Export of Indian telecom products, Skill promotion of labor force and promotion of Startups for new technologies like 5 G, IoT, Blockchain etc.

The study finds the achievements of Govt policies for Make in India in Telecommunications as well as limitations of these schemes especially PLI, DLI and PMA policy. PLI policy in field of Large scale IT sector like Mobile has been successful in terms of investment and incremental Production and export target whereas in IT Hardware like Laptop , PC , Server it has failed miserably . PLI policy in field of hardware of Network and Telecom products is on good path but it needs more time to yield result as establishing manufacturing unit and making production at such large scale needs state of the art technology and investment.

The study has found that there is need of strengthening of govt institutions for manufacturing , Standardization and quality testing of Telecom Equipment , R&D for semiconductor Field and New Technology with PPP model and premier educational institutes should be involved in R&D programmes. More indigenization and value addition of Indian Content is desired objective of the scheme so that import dependency is minimized.

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ACRONYM

BSNL	Bharat Sanchar Nigam Limited
C-DOT	Center for development of Telematics
CSSS	Champion Service Sector Scheme
DCIS	Digital Communication Innovation Square
DLI	Design Linked Scheme
DOT	Department of Telecommunication
EMC	Electronics Manufacturing Clusters
HSPA	High Speed Packet Access
IPR	Intellectual Property Right
KPI:	Key Performance Indicators
MeitY	Min of Electronics and Information Technology
M-SIPS	Modified Special Incentives Package Scheme
MTCTE	Mandatory Testing and Certification of Telecommunication Equipment
MTNL	Mahanagar Telephone Nigam Limited
NATEM	Networking and Telecom Equipment Manufacturing
NTP	New Telecom Policy
PLI	Productivity Linked Scheme
PMA	Preferential market Access
PPP-MII	Public Procurement –Preference to Make In India
SPEC	Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors
TCOE	Telecom Centres of Excellence India
TEC	Telecom Engineering Centre
TEPC	Telecom Export Promotion Council
TRAI	Telephone Regulatory Authority of India
TSDO	Telecommunication's Standards Development Organization
TSDSI	Telecom Standards Development Society India
TSP	Telecom Service Providers
TTDF	Telecom Technology Development Fund
VoIP	Voice over Internet Protocol

CHAPTER 1: INTRODUCTION

1.1 Overview

The telecom sector in India has experienced a significant growth in recent years, with a high demand for mobile and internet services. The sector has seen a tremendous shift since the introduction of mobile telephony in the country in 1995. In 2023, India is the second-largest market for smartphones in the world.

The telecom sector in India is highly competitive, with a number of players in the market. The major telecom companies operating in India include Airtel, Vodafone Idea, Jio, and BSNL/MTNL. These companies offer a range of services, including mobile telephony, broadband, and digital TV.

The Indian government has taken several initiatives to promote the growth of the telecom sector in the country. One of the key initiatives is the Digital India campaign, which aims to transform India into a digitally empowered society and knowledge economy. The campaign has led to the development of various digital services, including e-governance, e-commerce, and digital payments.

The telecom sector in India has been also affected by the ongoing COVID-19 pandemic. The pandemic has led to a surge in demand for internet and digital services, as more people have shifted to remote work and online education. However, the pandemic has also led to challenges for the sector, including disruptions in the supply chain and a decline in consumer spending.

Despite the challenges, the telecom sector in India is expected to continue its growth trajectory in the coming years. The government's focus on promoting digital services and the increasing adoption of smartphones and other digital devices is expected to drive demand for telecom services in the country. Additionally, the

rollout of 5G technology is expected to provide new opportunities for growth in the sector.

A large amount of telecom design and development has been carried out in India for multinational companies but hardware side has been constrained by inadequate design capabilities, lack of killed manpower, insufficient investment in R&D, IPR creation and manufacturing eco-system.

Although Indian software companies have done a significant level of outsourcing for foreign technology companies, there has been hardly any enabling R&D ecosystem leading to a significant outflow of IPR Intellectual Property Right. Due to import of Telecom Equipment, the IPR rights and R& D credits go to foreign manufacturers. The IPR value is close to 15% of the sale price, when the systems are first introduced, and it goes down as time goes on . To realize the value the IPR has to go into standardization , based on which the systems are deployed. The design and development of the systems add further value. In the early days of any new standard, significant part of the sale price is thus contributed by the R&D. There was clear need to promote Indian interests, service providers' requirements, and Indian IPR, into International standards and products/services.

For Telecom imports, dependence of India on European Countries in general and China in particular has been increasing over the years. According to TRAI, the demand for telecom equipment in India was Rs. 54765 crore (US$12 billion) in 2009-10, constituting about 5.5% of the global demand. This was projected to grow to Rs 170,091 crore (US$ 37 billion) in 2020. This large domestic demand was perfect launch pad for starting Make in India Initiatives in Telecom sector electronics Sector as it would have 'ripple effect' on employment, increased share of manufacturing in GDP and export of equipment and services, technical knowledge and IPR creation.

MNCs are supported by credit finance agencies, enjoy economies of scale, and earn higher revenues due to large volumes rendering local manufacturers non-competitive. In India, the local manufacturers face various problems related to

poor infrastructure, high cost of testing and certification, restricted market access, and reluctance of private players who prefer cheaper imports. Also, domestic industry lacks the ability to continually invest in R&D.

A large population, low telecom penetration and a rise in consumer income and spending leading to strong economic growth helped India making the fastest growing Telecom market in the world. Despite significant growth of the telecom network and the subscriber base over the last decade, the telecom manufacturing sector has not shown corresponding increase. Make in India in the sector of Telecommunication has wide range and for sake of focus the Study has been restricted to Manufacturing sector of Telecommunication and IT/Electronics sector for hardware and software.

The exponentially increasing market, propelled by the emerging 5G technology, provides tremendous opportunities for equipment manufacturers to grow into a potent player in the telecom universe. It becomes imperative for a country to have an agile manufacturing setup for Telecom manufacturing so that value addition to the economy can be maximized.

The growth of the domestic Networking and Telecom Equipment manufacturing (hereinafter referred as NATEM) would create various forward and backward linkages and expand demand for other electronic components. It would also develop the technical know-how and skills of people in the country, lower the import requirement for telecom end products, and enable the sector to align with Government of India's vision of Aatmanirbhar Bharat. Robust Telecom sector is also a prerequisite in view of growing security concerns regarding data privacy and overarching geopolitical concerns surrounding personal data protection.

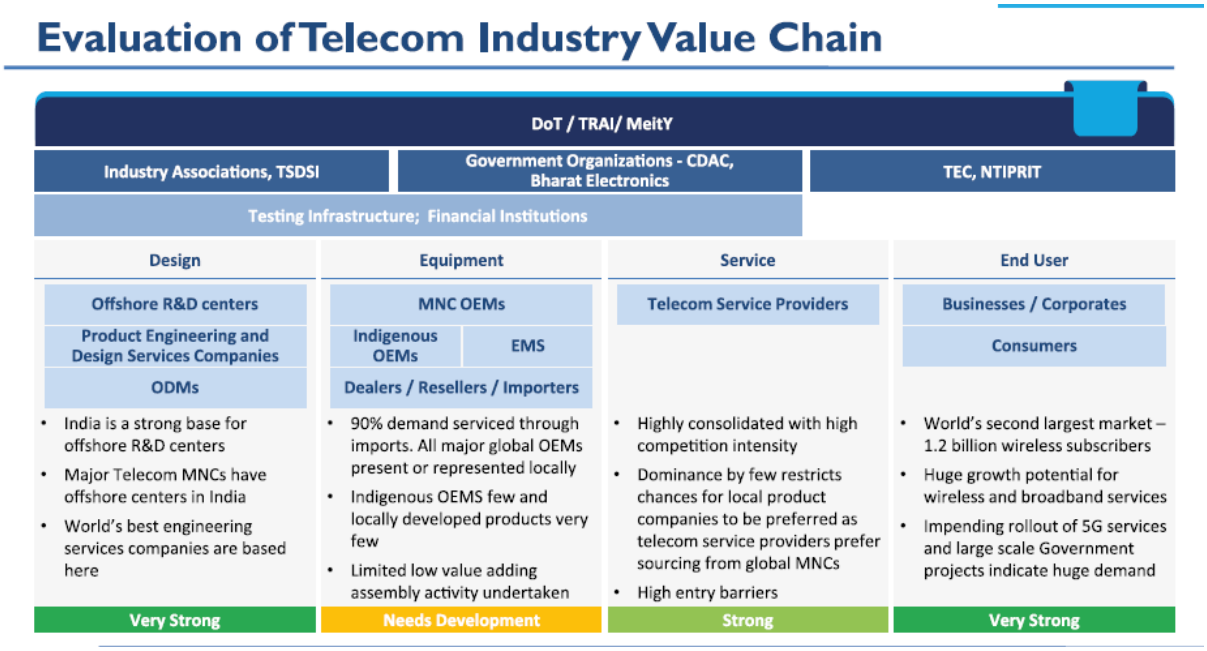

Figure 1.1: Evaluation of Telecom Industry Value Chain

The challenges for Domestic Manufacturing of Telecom products were many such as Low/Zero import duty on telecom equipment such that Telecom service providers have preference for Global brands , there was low investment in R&D and IPR creation and lack of market access for indigenous manufacturers.

To make India a global manufacturing hub, there have been several requirements identified by experts and policymakers. Among these, reducing trade costs and liberalizing foreign direct investment (FDI) are considered to be crucial factors.

Reducing trade costs can help in making Indian exports more competitive in the global market. This can be achieved through measures such as improving trade infrastructure, reducing transportation and logistics costs, and streamlining customs procedures. The government has taken several initiatives in this direction, including the implementation of the Goods and Services Tax (GST) and the development of dedicated freight corridors.

Liberalizing FDI policies can also help attract foreign investment and technology to India. The government has taken several steps to liberalize FDI policies in recent years, including raising the FDI limit in various sectors such as defence, aviation,

and retail. The government has also simplified the FDI approval process and introduced measures to improve the ease of doing business in India.

Other factors that can help in making India a global manufacturing hub include investing in skill development, promoting innovation and research, and improving the overall business environment. The government has launched several initiatives in these areas, including the Skill India mission, the Make in India campaign, and the Aatmanirbhar Bharat initiative.

However, there are also several challenges that need to be addressed to make India a global manufacturing hub. These include issues such as land acquisition, labour laws, and environmental regulations. Addressing these challenges will require a coordinated effort from the government, industry, and other stakeholders.

1.2 JUSTIFICATION FOR MAKE IN INDIA IN TELECOM

As India has been lagging behind China and other Asian Tigers during last decade in ease of doing business and other parameters of Telecom Manufacturing sector, a need has been felt to address the issues. For this purpose, the Indian government has taken several measures to improve the ease of doing business in the country. Some of the key measures include:

- Streamlining regulatory processes: The government has simplified and streamlined various regulatory processes to make it easier for businesses to operate in India. For instance, the government has introduced online platforms for company registration, tax filing, and other regulatory compliance.
- Reducing compliance burden: The government has taken steps to reduce the compliance burden on businesses. For instance, the government has simplified the tax system by implementing the Goods and Services Tax (GST) and reduced the number of filings required for various regulatory compliance.
- Improving infrastructure: The government has invested in improving infrastructure such as ports, airports, and roads to improve connectivity and reduce logistics costs for businesses.

➢ Labour reforms: The government has introduced labour reforms to simplify labour laws and make it easier for businesses to hire and fire employees.

➢ FDI liberalization: The government has liberalized FDI policy to attract more investment into the country. The government has raised the FDI limit in various sectors, simplified the approval process, and introduced measures to improve the ease of doing business for foreign investors.

A lot of Policy measures have been taken by Govt. for R&D, Intellectual Property Right (IPR) and Standardization of the Telecom Products and services. These measures have started showing results, and India has seen a significant improvement in the ease of doing business rankings in recent years. However, there is still a long way to go, and the government needs to continue its efforts to improve the business environment in the country.

1.3 INDIAN TELECOM SECTOR: SOME FACTS

In the telecom sector subscriber base went steadily over the years and has appx 1.16 Billion subscribers and over 800 million Broadband internet users on Nov 2021 with 12 GB/user data consumption which is expected to touch 1.42 Billion mobile users, 900 million Broadband users and 25 GB/per user data consumption by 2025 . The Telecom industry ecosystem comprises of Telecom Service Providers (TSPs), Telecom Infrastructure Providers, Handset Manufacturers and Telecom Equipment Manufacturers. Some of the major achievements of the telecom industry are as under:

- Telecom Industry generates over 4 million (direct 2.2 million and indirect 1.8 million) jobs and contributes 6.5% to India's GDP.

- The Indian mobile Industry created a total economic value of US$ 217.4 billion by 2020.

- Many mobile manufacturing units have been set up in last 5-6 years and result has been encouraging after launching of PLI scheme in Mobile phones under Make in India mission

• FDI inflow into in Indian Telecom sector constituted 6.43 % of total FDI inflow (2014-2021). FDI in the Manufacturing industry has increased from USD 8.637 billion in 2015-16 to USD 37.6 Billion in Jan 2020-Dec 2020, 7.21% of total FDI of $ 522 billion in India since 2000.

• The number of mobile towers has increased from 4.0 Lacs in 2014 to 6.60 Lacs in 2021 and similarly the number of Base transceiver stations has grown rapidly by 187 % and increased from 8.0 lacs in 2014 to 2.3 million in 2021.

• India is going to become the second largest smartphone market globally by 2025 with around 1 billion installed devices, with 920 million mobile subscribers (88 Million 5G connections included) and it is estimated that 5G technology will contribute approximately $ 450 billion to the Indian economy during the period 2023-2040.

• DoT (Dept. of Telecom) has set target of 100% broadband connectivity in the villages, 55% fibrisation of mobile towers, and average broadband speed of 25 Mbps and 30 Lac kms of Optic fibre rollout by 2022 which is to go up to 70 % fibrisation, 50 Mbps average speed and 50 Lac Kms of optic fibre by Dec 2024.

• Digital India, Smart Cities, Digital Saksharta Abhiyan (DISHA), National Broadband mission, Industry 4.0 etc. are expected to multiply the demand for telecom products and it is expected that India's digital economy will be of 1 Trillion $ by 2025.

1.4. STATEMENT OF THE PROBLEM

As a result of government policy of Make in India, significant progress has been achieved in telecom sector manufacturing in the country.

Telecom policy, 2012 emphasized the convergence and desirability of encouraging all technologies as 80% of telecom deployment in the network was imported posing serious threat to Security concerns and Trade deficit.

India was meeting over 80-90 per cent of its robust demand for telecom equipment (accounting for about 8 per cent of global demand) through imports. Apart from economic reasons, the security concerns arising out of excessive reliance on foreign manufactured products also suggest that India should aim at achieving self-sufficiency in telecom equipment manufacturing. High dependence on import of IT and Telecom products also posed serious challenge to trade deficit. The target of the government to meet net zero imports by 2022 could not be achieved due to lack of aggressive focus on design oriented, high value addition (VA) based manufacturing in the country.

Ericsson, Nokia, Alcatel, Motorola, ZTE and Huawei were international players during that time and it was proposed to start investing heavily on R&D, testing, IPR and skill development of human resource, with appropriate Preferential Market policy (PMA) and other incentive from the government in this regard like financial support by way of dedicated funding for R&D, tax breaks on R&D etc. and low cost of fund provision. There was a need to strengthen the R&D institution like C-DOT/CDAC & CEERI, creation of Telecomm Research & Development Fund (TRDF) as was suggested by erstwhile Planning Commission in XII plan for Design, development, testing & manufacturing in the sector.

For phased manufacturing program with Productivity Linked Incentives (PLI) for promoting indigenous manufacturing, Ministry of Electronics & Information Technology MeitY on 28 April, 2020 announced for mobile handsets /its sub-assemblies and parts/sub-parts, mobile phone manufacturing and specified electronic components, including Assembly, Testing, Marking and Packaging (ATMP) units under large Scale Electronics manufacturing and for later on for IT hardware (Laptop, All-in One-PC, Gadgets , Tablets, Servers) and thereafter Electronics System Design and Manufacturing (ESDM) by encouraging and driving capabilities in the country for developing core components, including chipsets, and creating an enabling environment for the industry to compete globally.

The Government of India has launched a Production Linked Incentive (PLI) scheme with an allocation of Rs 12,195 crore for the manufacturing of telecom and network

equipment in India. The scheme aims to promote domestic manufacturing of telecom equipment and reduce India's reliance on imported equipment.

Under the scheme, eligible manufacturers will receive a financial incentive of 4-7% on incremental sales of manufactured goods for a period of five years. The scheme covers a wide range of telecom and network equipment, including routers, switches, radio access networks, and wireless equipment.

The scheme is expected to attract global manufacturers to set up production facilities in India and boost domestic manufacturing of telecom equipment. This is expected to create job opportunities in the sector and promote the development of a self-reliant telecom industry in India.

The PLI scheme for telecom and network equipment manufacturing is part of the Indian government's larger effort to promote domestic manufacturing under the Aatmanirbhar Bharat initiative. The government has launched several other PLI schemes under Make in India for various sectors, including electronics, pharmaceuticals, and automobiles.

The success of the scheme will depend on the ability of manufacturers to meet the eligibility criteria and the demand for telecom and network equipment in India. The scheme will also face competition from other countries that are offering similar incentives to attract manufacturers to their countries.

1.5 THE RESEARCH OBJECTIVES

Broadly, the objective is to identify various initiatives of Government of India for making quantitative as well as qualitative change in domestic production of Telecom products and services through Make in India initiatives in telecommunication. The objectives of the study are:

i. To examine various Government policies for Make in India in Telecom sector especially Productivity Linked Schemes / Design Linked scheme and to study the issues and challenges in implementing these Schemes in telecom/IT sectors.

ii. To study the gap between R&D and commercialization.

iii. To suggest suitable measure to boost the production through the Make in India in telecom sector.

To make a global hub of telecom manufacturing for meeting domestic demand as well as for export all out efforts have been taken to make eco-system viable and all aspects technical barriers have been addressed like the design, development, R&D, CEZ/SEZ/TEZ Electronics Cluster, Fiscal incentive &Human Resource development, incentivizing operators for procurement from domestic producers .

1.6 ORGANISATION OF THE STUDY:

Chapter-2 presents a 'Review of the Literature', while Chapter-3 outlines the Research Methodology and Data Collection'. Chapter-4 examines the Policies and Plans related to the manufacturing of telecom equipment and Chapter-5 presents an Analysis of the issues and challenges involved. The Telecom Industries in China and the USA are outlined in Chapter-6. Finally, Chapter-7 provides 'Conclusions and Recommendations' based on the findings of the study.

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CHAPTER 2: LITERATURE REVIEW

Digital literature on the websites of Department of Telecommunication (DoT), Ministry of IT, MeitY BSNL, NITI Aayog, DPIIT , TEMA (Telecom equip Manufacturer Association), along with TRAI paper etc. have been reviewed for analysis, besides Research papers by many academicians are available in the field of indigenous Telecom Equipment Manufacturing, Make in India, Preferential Market Access. The reports of the seminar during recent times, magazines & websites on Aatmanirbhar Bharat, Investindia.gov.in have also been relied upon during the course of study. Policy Research TRAI papers have also been reviewed in the above field. Some studies that have been reviewed are as follows:-

i. TRAI Consultation Paper (No.17/2010) has been reviewed on encouraging Telecom Equipment Manufacturing in India through FDI in telecom, Skill development, Tax incentive to domestic industries and IPR/patents. Some its recommendations on indigenous Design of Manufacturing, setting of centres of Excellence in R&D and creation of TDF (Telecomm development fund) have been accepted in NTP 2012 and consequently implemented.

ii. National Telecomm Policy, 2012 aimed to promote the ecosystem for design, Research and Development, IPR creation, testing, standardization and manufacturing. It aims to meet Indian telecom sector demand to the extent of 60% and 80% of equipment with a minimum value addition of 45% and 65% by the year 2017 and 2020 respectively and to make Zero import by 2022 in India in telecom sector. The policy was appropriate but creation of clusters like SEZ/CEZ in large sector has not been realized and it is not successful as in China.

iii. Dr Banerjee, Geeta (2005) in work on “Manufacturing industry in India in telecom sector-Problems & opportunities” discussed about Telecomm

equipment manufacturing, policies & Plan, R&D Policies & Plan and issue in manufacturing. In this dissertation, recommendation on skill development &FDI Role is not elaborated in details.

iv. Kumar, M. Prasanna (2014), "Telecom Services: Emerging Trends, Opportunities and Risk" has been reviewed to understand with the good opportunities in the telecom services for fixed and wireless line, the risk in the telecom services, the emerging trends in telecom services during the period.

v. Mr. Vijay Arora and Dr. Suresh Bedi, (2015), "Make in India: Current Concerns and Challenges in the Telecom Sector" is reviewed for indigenization of telecom products in Core sector for data security, deployment of domestic telecom products by all Telecom service Providers and for Import and Import TAX/GST reform. The paper emphasized for need of manufacturing Industry for Tax incentive, Export subsidies & cost effective infrastructure in order to set up industries.

vi. Agrawal Krishan Kumar (2019) dissertation, 'Promoting Indian Manufacturing in Telecom Sector: Issues & opportunities' has been reviewed and it is observed that Preferential Market Access to domestic manufacturing sector and the requirement of incentive schemes , Telecom Development Fund and strengthening of ITI /C-DoT/TCOE has been discussed. But the incentive schemes based on Production, investment and Design is not discussed and also graded value addition of Indian Content in manufacturing sector of PMA is not covered.

vii. TRAI Consultation Paper (June /2018) has been reviewed on encouraging Telecom Equipment Manufacturing in India focuses on FDI in telecom, Skill development, Tax incentive to domestic industries IPR/patents. The Paper focussed on HR development in Electronics & telecom, Incentive & fund arrangement for R&D.

viii. National Digital Communications Policy, 2018 (NDCP-2018) has been reviewed to unlock the transformative power of digital communications networks to achieve the goal of digital empowerment

of the country. The policy seeks to remove regulatory challenges and create attractive investment opportunities in new technology segments and stimulate the deployment of new technologies in India.

ix. Preferential Market Access is another Policy initiative that envisages preference to domestic products and services, with domestically owned IPR, in the procurements done by government. PMA was initiated in 2012 but for Make in India (PMI) policy, Department for Promotion of Industry and Internal Trade (DPIIT). Issued preferential access to domestic manufacturers PPP MII Order 2017 with objective to encourage 'Make in India' and promote manufacturing and production of goods, services and works in India with a view of enhancing income and employment. The Guidelines have been modified time to time and Dept. of telecom and IT ministry follows it for manufacturing of telecom goods, addition of Indian contents in Telecom products and also for securing reliable products. Website of DPIIT and Ivestindia.gov.in gives insight of these schemes.

x. Miss Mansi Kedia Policy paper (Feb 2014) on 'Policy Paper 'Deconstructing India's Preferential Market Access '(PMA)' is reviewed for efficiency of PMA policy. , PMA is defended for Security reason in Telecom sector and cost disadvantage to India due on to joining the WTO's Information Technology Agreement I (ITA I) in March 1997.

xi. TRAI Consultation paper on Promoting Networking and Telecom Equipment Manufacturing in India (11.02.2022) is reviewed for Productivity Linked Schemes PLI and Design Linked Schemes DLI exhaustively of Ministry of Electronics and technology and Dept. of Telecommunication. Over and above, the internet and the website published by various telecom companies and government department have provided essential knowledge on the subject matter i.e. various govt. websites of Invest India , Start-up India , Aatmanirbhar India, Make in India, TSDSI , TEC etc. and telecom magazines websites .

xii. MeitY Ministry of Electronics and Information Technology is reviewed for various incentives schemes since 2020 for Large Scale Manufacturing like Mobile etc., IT hardware, Semiconductor Field and its associated products and also Production and Design Linked schemes. The guidelines are available on https://www.meity.gov.in/

xiii. Dept. of Telecom as launched incentive schemes in 2021 for Manufacturing in Telecom and Network equipment manufacturing with ease of doing business and PLI and DLI scheme and Guideline are available on dot.gov.in. Where information about USOF and TTRF are also available. In the make in India and invest India website (http://www.makeinIndia.com/policy/new-initiatives ,www.investindia.gov.in ,www.dot.gov.in) information related FDI, IPR, SEZ/CEZ is available. The government in 2021 allowed 100 per cent foreign direct investment in the telecom sector through automatic route to promote ease of doing business in the industry. Earlier, 100 per cent of FDI was allowed, of which 49 per cent of investment was permitted through automatic route.

xiv. Digital Communication Innovation Square (DCIS**)** Scheme is reviewed. As Dept of Telecom under Champion Service Sector Scheme (CSSS) has launched promotion of Start-up business /MSME for software sector in 5 G and new technology with help of TCOE Telecom Centres of Excellence India. Similarly, TSDSI is working for standardization of standards of Software, Anti-Trust policy and IPR protection.

xv. TEC Telecom Engineering Centre tec.gov.in website gives information for Generic requirement of hardware equipment's and mandatory testing of telecom products for deployment in Indian market and research on 5G, 6G technology

xvi. Telecom Equipment and Services Export Promotion Council (TEPC) www.telecomepc.in website gives information about export of Telecom Equipment and services through various coordinated activities.

xvii. DOT Annual Report 2021-22 has been reviewed to get the information on the mobile and internet customers and growth of telecom users in the country.

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CHAPTER 3: RESEARCH METHODOLOGY AND DATA COLLECTION

3.1 RESEARCH STRATEGY AND DESIGN

A Lot of development has taken place in Telecom Manufacturing with current schemes of Production linked and Preferential Market access. The present study of Telecom Manufacturing Sector is exploratory and descriptive in nature. Through the content analysis of available literature and data, the study seeks to deepen the understanding the present policies. The study primarily relies on the analysis of secondary data to examine the capability & capacity of Make in India in Telecom Equipment Manufacturing in India and achievements of the sector.

1. Research Strategy: Quantitative and Qualitative methods have been used for analysis.
2. Research Design : The Research design is descriptive and exploratory in nature based on the following :

i. Deliberation and discussions have been held with officials in of Telecom Ministry, TRAI and experts on Telecom Manufacturers in NCR as a sample for primary data collection – few private & public sector. A questionnaire has been canvassed from all stake holders and with great persuasion the responses were collected & now responses are analysed.

ii. Secondary data available in public domain i.e. reports from DOT, MEITY, TRAI and other Govt portals, Aatmanirbhar bharat, Make in India, Investor india.gov.in of last 10 years have been used for analysis & interpretation. Similarly reports of Private sector consultancy firm like PWC, E&Y, KPMG have been analysed. Measures taken to drive indigenous R&D and IPR protection, Coordination between R&D agencies/ standardization agencies and Telecom Equipment Manufacturer, Reforms in policies in Telecom, IT and Commerce Dept. And PSUs, Synergy between Departmental PSU and Private Sector have been studied and analysed.

3.2 RESEARCH LIMITATIONS:

i. Availability of Policy makers and key stake holders (Govt. of India, DoT, TRAI, COAI, TEMA etc.) for interview/ discussion.

ii. Although Make in India commenced in 2014, PLI/DLI schemes /PMA, Start-up schemes were launched in 2020/2021 and the selected companies have started the process of production of telecom goods in targeted sector, these selected Companies (Foreign/Domestic) need Gestation period to give the desired result of investment and Manufacturing. Till now encouraging result is achieved in Mobile set manufacturing whereas in Telecom Gears only one Company GX Telecom has claimed recently and got Incentives amount after producing the targeted amount of products. Full results and effects will be visible by 2025-2026. As far as Government is concerned, it has taken all steps for Skill development R&D initiative, IP creation, Ease of Doing Business and liberal financial schemes. Incentive to Domestic Production, Export Promotion of Indian telecom goods /services , Deployment of these Domestic Telecom products into Indian Telecom sector , Promotion of software through Start up in new Technologies like AI, IOT,5G, 6G etc. and status of the Telecom Manufacturing is being monitored at High level of Government of India (eGoM-empowered Group of Ministers).

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CHAPTER 4: POLICY & PLAN: MANUFACTURING OF TELECOM EQUIPMENT THROUGH MAKE IN INDIA INITIATIVES

4.1 Introduction

The manufacturing sector in Telecom under Make in India initiatives is expected to play a crucial role in India's Economic growth and development in the country. The opportunities for manufacturing sector are enormous as with a population of over 1.4 billion, India offers a massive domestic market for manufactured goods. India has a large pool of skilled labour, particularly in engineering and technology, making it an attractive destination for manufacturing firms and Government is enhancing skills through various Skill India initiatives.

India's manufacturing sector is becoming increasingly competitive on the global stage and The Indian government has introduced a number of initiatives aimed at promoting manufacturing, including providing financial incentives and simplifying regulations.

Telecom equipment manufacturing is a critical part of the telecom sector, but it also faces several challenges and issues. Some of the main issues facing telecom equipment manufacturing are:

i. Cost: The cost of manufacturing telecom equipment can be quite high, particularly for advanced technologies such as 5G. This can make it difficult for smaller manufacturers to compete with larger companies.
ii. Technology obsolescence: Telecom equipment has a relatively short lifespan compared to other types of manufacturing. As new technologies are developed, older equipment can quickly become obsolete, which can result in significant losses for manufacturers
iii. Supply chain disruptions: The global supply chain for telecom equipment can be complex and can be subject to disruptions such as natural disasters,

geopolitical tensions, and other factors. These disruptions can cause delays and increase costs for manufacturers.

iv. Intellectual property issues: Telecom equipment manufacturing involves the development and use of proprietary technologies, which can lead to intellectual property disputes and legal challenges.

v. Standards and interoperability: As the telecom sectors continue to evolve, new standards and protocols are developed that must be followed to ensure interoperability between different types of equipment. This can be a challenge for manufacturers, particularly smaller ones.

vi. Regulatory compliance: Telecom equipment manufacturers must comply with a wide range of regulations, including safety, environmental, and labour laws. This can add to the cost and complexity of manufacturing and can make it difficult for smaller manufacturers to compete.

vii. Competition: The telecom equipment manufacturing industry is highly competitive, with many large players vying for market share. This can make it difficult for smaller manufacturers to gain a foothold in the market.

4.2 Issues in Telecom Equipment Manufacturing in India

i. Lack of infrastructure: The telecom manufacturing industry in India lacks proper infrastructure, which affects its growth and development. Inadequate power supply, poor road and transportation facilities, and limited availability of skilled labour are some of the issues faced by the industry.

ii. High costs: The cost of setting up and operating a telecom manufacturing unit in India is relatively high due to the high cost of land, raw materials, and relatively poor labour laws. This makes it difficult for small and medium-sized enterprises to enter the market and compete with established players. According to an estimate the infrastructure disabilities lead to a cost disadvantage of 6 to 8 percent for Indian manufacturers.

iii. Dependence on imports: India is heavily dependent on imports for telecom equipment and components. This results in a huge outflow of foreign

exchange and makes the country vulnerable to supply chain disruptions and price fluctuations in the global market.

iv. Lack of innovation and Technology: The Indian telecom manufacturing industry lags behind in terms of innovation and research and development (R&D) and inadequate investment in technology. This results in the industry not being able to compete with global players in terms of product quality and technological advancement.

v. Regulatory Environment: In spite of so many reforms to simplify regulations the regulatory Environment is still complex and challenging for manufacturers, particularly for obtaining permits and complying with regulations.

4.3 Types of Reform needed in Telecom Manufacturing in India:

i. Government support: The Indian government can provide incentives and subsidies to promote the growth and development of the telecom manufacturing industry. This can be done through the creation of a favourable policy environment and the provision of infrastructure support.

ii. Research and Development & IPR creation: The government can encourage and support research and development initiatives in the telecom manufacturing sector. Existing Funds should be utilized wisely and existing institutes for R&D and Standardization of Hardware, Software, Market Access need to strengthened. This can be done by creating a separate fund or establishing partnerships by Govt/ PSUs with industry players and academic institutions.

iii. Skilling and training: The government can also focus on skilling and training programs to address the shortage of skilled labour in the core equipment sector of telecom manufacturing. This can be done through the creation of skill development centres and vocational training institutes.

iv. Attracting foreign investment: The government can attract foreign investment in the telecom manufacturing sector by providing a conducive policy environment, tax incentives, and other benefits to foreign investors. This will help in the transfer of technology and knowledge and ease of doing business, which can help in the development of the industry.

v. Localization: The government can encourage localization of telecom manufacturing by mandating that a certain percentage of equipment/content used in the industry should be domestically manufactured. This will promote the growth of local players and reduce the dependence on imports. It is to be obtained through preferential market access and other financial support and incentives. There should be incentives for deployment of Local Telecom Products through Telecom service Providers.

4.4 Major Concerns in Domestic Manufacturing:

There are several major concerns in domestic manufacturing including:

i. Cost: One of the biggest challenges faced by domestic manufacturers is the cost of production. Many countries with lower labour costs, fewer regulations, and lower taxes can produce goods at a lower cost than domestic manufacturers, making it difficult for our domestic manufacturers to compete with them.
ii. Labour: The availability of skilled labour is another major concern. In some industries, such as high-tech manufacturing and fabrication like Semiconductor, finding workers with the necessary skills and education can be a challenge.
iii. Innovation: Domestic manufacturers need to continually innovate to stay competitive. This requires investment in research and development and staying ahead of technological advancements. IPR policy needs to be strengthened to protect genuine innovation/research.
iv. Supply Chain Disruptions: The COVID-19 pandemic highlighted the importance of supply chain resilience. Domestic manufacturers face challenges with managing disruptions in their supply chains, such as delays, shortages, and price increases.
v. Regulations and Policy: Regulations and policy decisions can impact the cost and profitability of domestic manufacturing. Changes in regulations related to labour, taxes, and environmental policies can have a significant impact on the competitiveness of domestic manufacturers.

vi. Infrastructure: Adequate infrastructure, including transportation systems and utilities, is essential for domestic manufacturers to operate efficiently. Without access to reliable infrastructure, domestic manufacturers may struggle to remain competitive.

4.5 Government Role in Promoting Domestic Telecom manufacturing through Make in India initiatives

The Indian government has taken several policy initiatives to promote domestic telecom manufacturing and reduce the country's reliance on imports. Some of the key policies are:

i. Production Linked Incentive (PLI) Scheme: In 2020-2021, the government launched a PLI schemes for the Electronics IT and Telecom Sectors, which aim to attract investment and promote domestic manufacturing of telecom equipment and IT Hardware and Electronics goods. The scheme provides incentives to companies for incremental sales of IT /telecom equipment manufactured in India.
ii. Modified Special Incentive Package Scheme (M-SIPS): The M-SIPS is a scheme that provides financial incentives to promote the manufacturing of electronics products in India, including telecom equipment. The scheme offers subsidies for capital expenditure, among other benefits.
iii. National Digital Communications Policy (NDCP) 2018: The NDCP 2018 aims to create a globally competitive telecom industry in India. The policy aims to promote domestic manufacturing of telecom equipment and encourage research and development in the sector.
iv. Preferential Market Access (PMA): The PMA policy aims to promote domestic manufacturing of telecom equipment by giving preference to domestically manufactured products in government procurement.
v. Skill Development Initiatives: The government has launched several initiatives to promote skill development in the telecom sector, such as the Skill India program and the Telecom Sector Skill Council.

4.6 Reform in New Telecom Policies of 1994, 1999 & 2012

The telecom policies of 1994, 1999, and 2012 brought out significant reforms in the Indian telecom sector. Some of the major reforms introduced in these policies include:

i. Competition: The 1994 policy encouraged healthy competition in the telecom sector, breaking the monopoly of the state-owned telecom company, and allowing private players to enter the market. This led to an increase in the number of players in the market, resulting in freedom of choice to consumers and increased innovation in the sector.
ii. Licensing: The 1999 policy introduced a unified licensing regime that allowed companies to provide a range of services, including fixed-line, cellular, and internet services, with a single license. This led to a reduction in the complexity of the licensing process and made it easier for companies to enter the market.
iii. Liberalization of Foreign Investment: The 1999 policy liberalized foreign investment in the telecom sector, allowing up to 100% foreign investment in telecom companies. This led to an increase in foreign investment in the sector and the entry of global players into the Indian market.
iv. Spectrum Management: The 2012 policy introduced a new framework for the management of spectrum, including the introduction of spectrum auctions, which ensured a more transparent and efficient allocation of spectrum.
v. Consumer Protection: The 2012 policy introduced several measures to protect consumers' interests, including the introduction of a National Do Not Call Registry, which allowed consumers to opt-out of receiving unsolicited telemarketing calls and messages.

vi. Broadband Connectivity: The 2012 policy also recognized the importance of broadband connectivity for the growth of the economy and set a target of providing broadband connectivity to 600 million citizens by 2020.

4.7 National Policy on Electronics (2012)

The National Policy on Electronics (NPE) was formulated in 2012 to promote the domestic electronics manufacturing industry and make India a global hub for electronics manufacturing. The policy aimed to achieve the following objectives:

i. Increase domestic value addition in electronics manufacturing: The policy aimed to increase domestic value addition in the electronics manufacturing industry from 10-15% to 25% by 2020.
ii. Foster innovation and R&D in electronics: The policy aimed to create an ecosystem that fosters innovation and research and development in the electronics industry, including promoting start-ups and encouraging collaboration between industry and academia.
iii. Encourage domestic production of electronic products: The policy aimed to increase domestic production of electronic products, reduce imports and promote exports.
iv. Promote eco-friendly practices in electronics manufacturing: The policy aimed to promote environmentally sustainable practices in the electronics industry, such as the use of green technologies and recycling of electronic waste as per Zero Effect Zero Defect policy.
v. Human Resource Development: The policy aimed to promote human resource development in the electronics industry by providing training and education opportunities to individuals in the sector.

To achieve these objectives, the policy proposed a number of measures such as offering financial incentives to electronics manufacturers, creating infrastructure for electronics manufacturing, providing tax exemptions, and promoting standards and quality control in the industry.

4.8 National Policy on Electronics (NPE) 2019

The NPE 2019 aims to create an enabling environment for the development of the electronics system design and manufacturing (ESDM) sector in India. The policy seeks to increase domestic value addition in electronics manufacturing, promote R&D, encourage domestic production of electronic products, promote eco-friendly practices in electronics manufacturing and promote human resource development in the sector.

4.9 National Digital Communications Policy (NDCP) 2018

The NDCP 2018 aims to create a robust digital communications infrastructure in India to enable the delivery of digital services to all citizens. The policy aims to promote the development of domestic telecom equipment manufacturing and reduce import dependence on telecom equipment.

These policies have helped in promoting the growth of the telecom equipment manufacturing sector in India. The government continues to introduce new policies and initiatives to further support this sector and make India a global hub for telecom equipment manufacturing. PM Gati Shakti Programme is also a boost in this field for infrastructure connectivity for movement of people, goods and services from one mode of transport to another.

4.10 Information Technology Agreements (ITA) in WTO

The Information Technology Agreement (ITA) is a multilateral trade agreement under the World Trade Organization (WTO) that was established in 1996. The agreement aims to eliminate tariffs and other trade barriers on a wide range of information technology products and services. The ITA currently has 82 participants, representing about 97% of global trade in information technology products.

Under the ITA, participants agree to eliminate tariffs and other trade barriers on a wide range of information technology products, including computers, telecommunications equipment, semiconductors, software, and scientific

instruments. The elimination of these trade barriers helps to reduce the cost of these products for consumers and businesses, and promotes the development of the information technology industry.

The ITA has been updated several times since its establishment in 1996 to include new technologies and products. The most recent update, known as ITA-2, was agreed upon in 2015 and expanded the list of products covered by the agreement to include new technologies such as touch screens, GPS devices, and medical devices. The ITA is seen as an important achievement in international trade, as it demonstrates the ability of countries to work together to reduce trade barriers and promote economic growth. It has been credited with helping to facilitate the growth of the global information technology industry and promoting the development of new technologies. **,**

India's decision to join the WTO's Information Technology Agreement I (ITA I) in March 1997, has been criticized for damaging its domestic manufacturing capabilities by permitting duty free imports , causing cost disadvantages to India so that Indian manufacturing sector lagged far behind Europe and China in Information and Communication technology

4.11 National Investment & Manufacturing Zone (NIMZs)

i. The first NIMZ was proposed in the state of Maharashtra in 2006, and since then, several more NIMZs have been proposed across the country. The government has identified several locations across India for the development of NIMZs, including Nagpur (Maharashtra), Tumkur (Karnataka), Prakasam (Andhra Pradesh), and Medak (Telangana). NMP promotes industrial clusters and aggregation through the establishment of National Investment and Manufacturing Zones (NIMZ), all over the country. Till 2013-14, 16 NIMZ have been set up in various parts of Country.

ii. NIMZs are expected to create jobs and boost economic growth in the regions where they are located. They are also expected to promote technology transfer and encourage the development of ancillary industries.

iii. To encourage investment in NIMZs, the government has provided several incentives, including tax breaks, simplified approval processes, and access to funding. The government has also established a dedicated agency, the National Industrial Corridor Development and Implementation Trust (NICDIT), to oversee the development of NIMZs and other industrial corridors

iv. NIMZs are large industrial areas that are developed with world-class infrastructure and are designed to be self-sustaining and integrated with the surrounding region. National Manufacturing Policy (NMP) in 2011 with an objective to enhance the share of manufacturing in GDP to 25% and to generate 100 million jobs over a decade gave boost to NIMZ because India share of Manufacturing GDP was stagnated at 15-16% whereas it was 25-34% for Asian countries.

v. The main objective of NIMZs is to provide a conducive environment for manufacturing industries to grow and flourish by providing them with state-of-the-art infrastructure, such as roads, power, water supply, and telecom facilities. These zones are designed to have all the necessary facilities for manufacturing industries to thrive, including training facilities, R&D centers, and logistics infrastructure.

4.12 Preference to Make in India

"Make in India" is an initiative launched by the Indian government in 2014 to promote the manufacturing sector in India and make India a global manufacturing hub. The main objective of this initiative is to attract foreign investment, promote innovation and protect intellectual property, create employment opportunities and to build the best in class manufacturing infrastructure in the country. There are several reasons for preference to Make in India:

i. Cost advantages: India offers cost advantages in terms of labour and raw materials, which makes it a favourable destination for manufacturing. This has resulted in many foreign companies setting up manufacturing units in India.
ii. Abundant skilled workforce: India has a large pool of skilled and semi-skilled workforce, which is a valuable asset for the manufacturing industry. The country also has a strong engineering education system, producing skilled professionals in various fields.
iii. Government support: The Indian government has introduced several policy measures and incentives to encourage domestic and foreign investments in the manufacturing sector. These policies aim to provide a conducive environment for businesses to operate and grow. A lot of work for infrastructure development has been made and a lot of incentives for production and deployment as well as export of domestic telecom products have been launched.
iv. Large domestic market: India has a large domestic market with a growing middle class, which offers a significant demand for manufactured goods. This makes it an attractive destination for businesses to establish a manufacturing base and cater to the domestic market.
v. Strategic location: India's strategic location in South Asia makes it an ideal hub for exporting goods to other countries in the region and beyond.
vi. The main factors impeding the growth of domestic manufacturing are:
    - Poor infrastructure and absence of Manufacture of components and sub-assemblies in India
    - Absence of large global Manufacturing vendors
    - Lack of Stable fiscal policies
    - Tax structure that encourages manufacturing
    - Market pull for domestic manufacturers
    - Lack of economies of scale and availability of long term financing at low interest rates.
    - Less R&D facilities, access to low cost funds and testing and certification.
    - Lack of skilled /trained workforce.

- Support for R&D, IPR, Standards and Product commercialization.
- Lack of aggressive export policy for domestic telecom products

4.13 Impact of New Schemes

Impact of New and Existing Schemes

Ministry of Electronics & Information Technology, Government of India

Digital India – Power To Empower

S. No	Mechanism	Impact on Disability (%)	Remarks
1.	PLI	4% - 6%	Financial incentive on large scale production
2.	SPECS	0-1.6%	20% Capex Subsidy annualised on 8% Capital Cost
3.	EMC 2.0	1%	Logistics, Plug and Play Infrastructure
4.	RoDTEP	0.2% - 0.7%	In lieu of MEIS as a Duty-Free Scrips administered by DGFT
5.	Concessional Rate of Income Tax	0.2% - 0.9%	
6.	Ease of Doing Business Measures	0.5%	Custom Bonded Warehouse, Port Logistics, ECB Reforms
	Total	5.9% - 10.7%	

Figure 4.1: Impact of New and Existing Schemes

Telecom manufacturers find manufacturing in India almost 10 % costly. So Govt schemes are for offsetting this difference so that Indian Products in Telecom become robust, qualitative and cost effective for domestic market and export worthiness.

Telecom equipment manufacturing is an important sector for the growth of the Indian economy. The Make in India initiative launched by the Government of India in 2014 aims to make India a global manufacturing hub. The initiative aims to promote the manufacturing of goods in India and increase domestic value addition in manufacturing. The initiative provides various incentives and support to domestic manufacturers in 25 key sectors and IT & Telecom manufacturing is major key sector.

In the euphoria of high growth in Telecom services , the equipment manufacturing in Telecom sector received least priority posing a serious challenge to India's continued success in the telecom sector as 80-90 % of

Telecom gears were being imported and trade deficit of telecom products was increasing. Therefore, the National Telecom Policy 2012 aimed at developing a strong equipment manufacturing base within India and to make a transition from an import dependent industry to a global manufacturing hub. In 2014 when Make in India was launched for manufacturing sector it was extended to telecom sector gradually as demand for Telecom goods and services had increased many folds due to technology upgradation and there was serious issue of Balance of payment and Security issues apart from loss of job opportunities.

To promote this sector, the Government of India has introduced various policies and plans. The Department of Industrial Policy & Promotion renamed Department for Promotion of Industry and Internal Trade (DPIIT) is instrumental is getting Policy for development of Domestic manufacturing and for FDI investment etc. and it influences all Departments in Policy matters.

4.14 Department of Industrial Policy and Promotion (DIPP)

The Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India, is responsible for formulating and implementing industrial policy and strategies for industrial development in India. The DIPP plays a critical role in promoting the manufacturing sector in India by formulating policies that encourage industrial growth, investment, and innovation. It has initiated several schemes and policies to support the manufacturing sector in India, including the Make in India initiative, National Manufacturing Policy, and the Start-up India campaign.

The National Manufacturing Policy aimed to increase the share of manufacturing in India's GDP to 25% by 2022 and to create 100 million additional jobs in the manufacturing sector. The policy provided a framework for the development of the manufacturing sector in India and identifies key areas for growth and investment.

The Start-up India campaign aims to promote entrepreneurship and innovation in India by providing incentives and support to start-ups. The campaign provides funding, mentoring, and other support to start-ups to help them grow and succeed.

In addition to these initiatives, the DIPP also works to simplify and streamline the regulatory environment for businesses in India, by reducing regulatory burden and promoting ease of doing business in the country. The department has implemented several reforms to improve the business environment, including the introduction of online systems for business registration, tax payments, and other regulatory compliance requirements.

The Department of Industrial Policy and Promotion was established in 1995 and has been reconstituted in the year 2000 with the merger of the Department of Industrial Development renamed Department for Promotion of Industry and Internal Trade (DPIIT). With progressive liberalisation of the Indian economy, initiated in July 1991, there has been a consistent shift in the role and functions of this Department. From regulation and administration of the industrial sector, the role of the Department has been transformed into facilitating investment and technology flows and monitoring industrial development in the liberalised environment.

The functions of the Department of Industrial Policy and Promotion include Monitoring the industrial growth and performance of industries specifically assigned to it, advice on all industrial and technical matters;

- Formulation of Policy, promotion, approval and facilitation of Foreign Direct Investment (FDI);
- Encouragement to foreign technology collaborations at enterprise level and formulating policy parameters for the same;
- Formulation of policies relating to Intellectual Property Rights in the fields of Patents, Trademarks, Industrial Designs and Geographical Indications of Goods and administration of regulations, rules made there under;
- Administration of Industries (Development & Regulation) Act, 1951
- Promoting industrial development of industrially backward areas and the North Eastern Region including International Co-operation for industrial partnerships and

- Promotion of productivity, quality and technical cooperation.

The Department is also responsible for facilitating and increasing the FDI inflow in the country. Foreign Investment Promotion Board (FIPB), now located in Department of Economic Affairs, Ministry of Finance, provides a time bound, transparent and pro-active FDI regime for approval of FDI investment proposals. The Department also plays a pro-active role in resolution of the problems faced by foreign investors in implementation of their projects through Foreign Investment Implementation Authority (FIIA), which interacts directly with the Ministry/State Government concerned.

The Department is responsible for encouraging acquisition of technological capability in various sectors of the industry through liberal foreign technology collaboration regime. Foreign technology induction is facilitated both through FDI and through Foreign Technology Collaboration (FTC) agreement. FTC agreements are approved either through the automatic route under the delegated power exercised by the RBI or by the Government.

Department of Industrial Policy and Promotion is also responsible for Intellectual Property Rights relating to Patents, Designs, Trade Marks and Geographical Indication of Goods and oversees the initiative relating to their promotion and protection. These include the outlining of policy and its implementation through the Office of the Controller General of Patents, Designs and Trade Marks. It promotes awareness regarding protection of the Intellectual Property Rights inherent in industrial property in conjunction with the World Intellectual Property Organisation (WIPO) and apex industry organisations apart from similar initiatives involving regional industry associations. It also provides inputs on various issues relating to the Agreement on Trade Related Aspects of Intellectual Properties (TRIPS) related to World Trade Organisation (WTO) in these fields.

The Department undertakes technical cooperation programmes with the World Intellectual Property Organisation (WIPO), Geneva for the modernisation and up gradation of intellectual property administration relating to patents, designs,

trademarks and geographical indications and the organization of Human Resource Development and awareness generation activities in the country.

The Department is the nodal point for the promotion of productivity in the industrial sector. International cooperation for industrial partnerships is achieved through both bilateral and multilateral arrangements. At bilateral level, in addition to being nodal Department for Indo-Swedish, Indo-Libyan, Indo-Hungarian and Indo-Belarus Joint Commissions, the Department is represented on joint commissions and joint working groups for promoting industrial, technical and scientific cooperation with select countries serviced by other Ministries/Departments. Similar initiative is also in place with the European Union. This Department is the nodal agency in the Government of India for various instruments of the Asia-Invest Programme of the European Commission. This Department also coordinates with apex Industry Associations such as FICCI, CII, ASSOCHAM in their activities relating to promotion of industrial cooperation and to stimulate foreign direct investment into India besides participating in the Joint Business Councils and other interactive sessions organised by FICCI, CII and ASSOCHAM etc.

Department of Industrial Policy and Promotion is the nodal Department in Government of India for coordinating and implementing programmes with United Nations Industrial Development Organization (UNIDO) in India. UNIDO is a specialised agency of United Nations with a mandate to act as the central coordinating body for industrial activities within the United Nations system. India has been an active Member of the Organization since its inception. Under the country service framework, UNIDO's activities in India are primarily focussed in the fields of strengthening competitiveness of the industry through technology upgradation, promoting investment and promoting cleaner and environmentally sustainable technologies.

4.15 Details of Plans /Schemes for Make in India in MeitY

- **Production Linked Incentive (PLI) for large scale Electronics manufacturing:** It was notified, by Ministry of Electronics and Information Technology (MeitY) on 01.04.2020, offering incentive on incremental sales for a period of five (5) years for locally manufactured mobile phones (having invoice value of Rs 15,000 and above) of MNC, mobile phones of domestic companies, and specified electronic components. With an incentive outlay of Rs. 36,440 crore the scheme is anticipated for a total production of about Rs. 10.5 lakh crore of which more than 60% of production will be for exports. The scheme extends an incentive of 4% to 6% on incremental sales (over base year) of goods manufactured in India and covered under target segments, to eligible companies, for a period of five (5) years subsequent to the base year as defined The scheme envisaged to bring in additional investment of Rs 11,000 crore and value addition expected to go up to 35-40% by 2025 from 20-25% presently. After the success of the first round of Production Linked Incentive scheme, the second round of the PLI scheme applicable from 01.04.2021 was approved. The target segment for the purpose of this round is specified electronic components.

Ministry of Electronics and Information Technology

IPHW Division

Table 4.1: List of companies approved under Round Round 1 of the PLI Scheme for Large Scale Electronics Manufacturing

Sl. No	Name of the Company
1	Wistron Infocomm Manufacturing (India) Private Limited
2	Foxconn Hon Hai Technology India Mega Development Private Limited

3	Pegatron Technology India Pvt Ltd.
4	Samsung India Electronics Pvt Ltd.
5	Rising Stars Mobile India Pvt Ltd.
6	Bhagwati Products Limited
7	Optiemus Electronics Limited
8	Padget Electronics Private Limited
9	LAVA International Limited
10	United Telelinks Neolyncs Pvt Ltd
11	AT & S India Pvt. Ltd.
12	Ascent Circuits Pvt Ltd.
13	Sahasra Semiconductors Pvt. Ltd.
14	Visicon Power Electronics Pvt. Ltd.
15	Walsin Electronics India Pvt. Ltd.
16	Neolync India Private Limited

Table 4.2: List of companies approved under Round Round 2 of the PLI Scheme for Large Scale Electronics Manufacturing

Sl. No	**Name of the Company**
1	TDK India Private Limited
2	Epitome Components Private Limited
3	Tibrewala Electronics Limited
4	Shogini Technoarts Private Limited
5	Vishay Components India Pvt Ltd
6	Globe Capacitors Limited
7	Rakon India Private Limited
8	Deki Electronics Limited
9	Shivalik Bimetal Controls Ltd
10	Cipsa Tec India Private Limited
11	Desai Electronics Private Limited

12	Alcon Electronics Private Limited
13	Keltron Component Complex Limited
14	Micropack Private Limited
15	Continental Device India Pvt Ltd
16	Vitesco Technologies India P Limited

In Mobile sector in 5-year period, the approved companies under the PLI scheme are expected to lead to total production of over Rs 10.5 lakh crore, of which nearly 60 per cent will be contributed by exports to the tune of Rs 6.5 lakh crore.

It is also expected that during this period, nearly 8 lakh new jobs (2 lakh direct and 6 lakh indirect jobs) will be created in the country. Samsung holds 20 % of Mobile market in India and 40 % export of Mobile is of Apple make.

In the first year global Mobile players were required to make an investment of Rs. 250 crore and manufacture goods worth Rs. 4,000 crore more than the previous year. The phones made by global players should have an invoice value of over Rs. 15,000. In the case of Indian Mobile players, the investment target was Rs. 50 crore in first year and they were required to manufacture phones worth Rs 500 crore in the first year. For Specified Electronics Components the investment requirement was Rs 25 crore in first year and incremental sale requirement of Rs 100 crore.

- **Production Linked Incentive Scheme (PLI) for IT Hardware:** MeitY offered a Production Linked Incentive since 01.04.2021 to boost domestic manufacturing and attract large investments in the value chain of IT Hardware for Target Segment of (i) Laptops (ii) Tablets (iii) All-in-One PCs and (iv) Servers. The scheme extended an incentive on net incremental sales (over base year) of goods manufactured in India. Over the next 4 years, the Scheme is expected to lead to total incremental production of up to Rs 3,26,000 crore, out of which more than 75 % will be for exports. Also, it is expected that Domestic value addition for IT Hardware will rise to 20-25% by 2025 from the current 5-10%, due to the impetus provided by the

Scheme. The total budget outlay of the Scheme is Rs 7,350 crore as approved by the Union Cabinet and expected investment of Rs 2500 Crore. It extends an incentive of 4% to 2% / 1% on net incremental sales (over base year) of goods manufactured in India and covered under the target segment, to eligible companies, for a period of four (4) years.

Table 4.3: List of companies approved under the PLI Scheme for IT Hardware

Sl. No	Name of company
1	Dell International Services India Pvt. Ltd.
2	ICT Service Management Solutions (India) Pvt. Ltd.
3	Rising Stars Hi-Tech Pvt. Ltd.
4	Flextronics Technologies (India) Pvt. Ltd.
5	Lava International Ltd.
6	Dixon Technologies (India) Ltd.
7	Infopower Technologies Pvt. Ltd.
8	Bhagwati Products Ltd.
9	Neolync Tele Communications Pvt. Ltd.
10	Optiemus Electronics Ltd.
11	Netweb Technologies India Pvt. Ltd
12	Smile Electronics Ltd.
13	VVDN Technologies Pvt. Ltd.
14	Panache Digilife Ltd.

- **Production Linked Incentives (PLI) for semiconductor and display ecosystem: SPECS** (Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors) was approved by Cabinet on 15.12.2021, for development of semiconductor and display ecosystem in India, with an outlay of Rs.76, 000 crore (>10 billion USD). The MeitY programme invites global companies and incentivizes for setting up of semiconductor and display manufacturing facilities as well as design in India by providing a CAPEX incentive of 25% on capital expenditure. This will give momentum to semiconductors and display manufacturing and facilitate capital support and technological collaborations. Broad incentives have been approved under the program include setting up of Semiconductor FABs and Display FABs in India, modernization and commercialization of Semi-conductor Laboratory, setting up of Compound Semiconductors / Silicon Photonics / Sensors

(including MEMS25) FABs and Semiconductor ATMP/OSAT26 facilities in India, product design linked incentive of up to 50% of eligible expenditure, and product deployment linked incentive of 6% - 4% on net sales for five years..

The Design Linked Incentive (DLI) Scheme shall extend product design linked incentive of up to 50% of eligible expenditure and product deployment linked incentive of 4% to 6% on net sales for 5 years. Support will be provided to 100 domestic companies of semiconductor design for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems and IP Cores and semiconductor linked design and facilitating the growth of not less than 20 such companies which can achieve turnover of more than ₹1500 Crore in the coming 5 years.

In India the Domestic consumption of Electronic Display Components was $5 billion in 2020 and it is expected to reach more than $ 10 Bn in 2025, Government of India is working closely with the State Governments to establish High-Tech Clusters with requisite infrastructure in terms of land, semiconductor grade water, high quality power, logistics and research ecosystem to approve applications for setting up at least 2 greenfield Semiconductor FABs and 2 Display FABs in the country.

- MeitY the Ministry of Electronics and Information Technology is taking steps for modernization and commercialization of Semi-conductor Laboratory (SCL) Mohali. MeitY is exploring the possibility for the Joint Venture of SCL with a commercial fab partner to modernize the brownfield fab facility.

To drive the long-term strategies for developing a sustainable semiconductor and display ecosystem, a specialized and independent “India Semiconductor Mission (ISM)” is to be set up. The India Semiconductor Mission will be led by global experts in the semiconductor and display industry. It will act as nodal agency for efficient and smooth implementation of the schemes on Semiconductors and Display ecosystem. Vedanta Semiconductors Ltd., a Joint Venture between Vedanta and Foxconn is an applicant under the Scheme, for setting up of semiconductor Fabs in India. Dholera Industrial City, Gujarat is final location for their proposal, with investment of $ 19.5 Bn, and have submitted definitive agreement. For The Schemes under Programme for Development of Semiconductor and Display

Ecosystem in India are Central Government Schemes any eligible applicant submit the application for setting up of semiconductor Fab in any State/ UT in India. Finalization of location is between State Government and applicant based on infrastructure requirements like availability of land, water, power etc., and fiscal support offered by the State Government.

Government of Gujarat has provided subsidy details to Vedanta project as given below :

Parameter	Subsidy
Capital Subsidy	40% of the support provided by the Government of India
Power Tariff	Rupee 2/unit for 10 years from the date of start of commercial production
Electric Duty	Exemption from paying electricity duty as per
	The provisions laid down under Gujarat Electricity Duty Act, 1958.
Water Subsidy	Rs.12/m3 for a period of 5 years starting from the date of start of commercial operations. The water tariff will be increased at the rate of 10% on a year-on-year basis for the subsequent 5 years.
	Additionally, to build a desalination plant in the initial five years, the Government will provide a capital subsidy of 50% of the plant cost, excluding the cost of land, for the captive desalination plant.
Land Subsidy	75% subsidy on the first 200 Acres of land required for the Semiconductor fab project. Any additional land, required for the core activities of the project, will be available at 50% subsidy.
Stamp Duty and Registration Fee	One-time reimbursement of 100% stamp duty and registration fee paid to the Government for lease/sale/transfer of the land for the purpose of the project.

Electronics Manufacturing Clusters (EMC 2.0) Scheme. The Modified Electronics Manufacturing Clusters (EMC 2.0) scheme has been notified to support creation of quality infrastructure with common facilities and amenities, including Ready

Built Factory (RBF) sheds/ Plug and Play facilities. This will attract major global manufacturers along with their supply chains to set up a production base in India.

Under Modified Electronics Manufacturing Clusters (EMC 2.0) scheme, Government has accorded approval to M/s. Maharashtra Industrial Development Corporation (MIDC) on 31stOctober, 2022 for establishment of an Electronics Manufacturing Cluster (EMC) over an area of 297.11 acres at Ranjangaon Industrial area (Phase-III), Pune, Maharashtra with a project cost of INR 492.85 Crore including Central Grant-in-aid of INR 207.98 Crore to address the industrial infrastructure requirement of electronics industry in the region. This EMC is projected to attract an investment of about INR 2,000 Crore and having potential to generate over 5,000 employment opportunities in coming years after fully operationalized.

In addition, PLI incentives to the quantum of Rs.98, 000 crore (USD 13 billion) are approved for allied sectors comprising of ACC battery, auto components, telecom and networking products, solar PV modules and white goods. In total, Government of India has committed support of Rs. 2, 30,000 crore (USD 30 billion) to position India as global hub for electronics manufacturing with semiconductors as the foundational building block.

4.16 Details of Plans /Schemes for Make in India in Dept of Telecom

- **PLI Scheme in Telecom Sector:** DoT through Production Linked Incentive (PLI) Scheme launched in 2021 provides a financial incentive to boost domestic manufacturing to Global as well as Indian companies and to attract investments in the target segments of Telecom and Networking Products. It is estimated that full utilisation of the Scheme funds is likely to lead to incremental production of around ₹ 2.4 lakh crores with exports of around ₹ 2 lakh crores over 5 years. It is also expected that the Scheme will bring in investments of around ₹ 3,000 crores and generate huge direct and indirect employment. This is in line with the larger objective of Make in India. The PLI Scheme will be implemented within the overall financial limits

of ₹ 12,195 Crores only (Rupees Twelve Thousand One Hundred and Ninety-Five Crore only) for implementation of the Scheme over a period of 5 years. For MSME category, financial allocation will be ₹1000 Crores.

Table 4.4: Specified Telecom and Networking Products (w.e.f. 01.04.2022)

Sr. No	Product Category	Description of Goods
1	**Core Transmission Equipment**	• Dense Wavelength Division Multiplexing (DWDM). • Optical Transport Network (OTN). • Multi Service Provisioning Platform (MSPP). • Synchronous Digital Hierarchy (SDH). • Packet Transport Network (PTN)/ Multi-Protocol Label Switching (MPLS). • Gigabit Passive Optical Networks (GPON)/ Next Generation- Passive Optical Network (NG-PON) Optical Line Terminal (OLT). • Digital Microwave Radio. • Millimeter Radio. • E/V-band Radios. • Satellite Gateway (Hub /Earth station) Equipment. • Free Space Optics Communication Equipment.
2	**4G/5G, Next Generation Radio Access Network and Wireless Equipment**	• 4G/ Long Term Evolution (LTE) Radio Access Network (RAN) Base Station & Core equipment. • 5G RAN Base Station & Core Equipment. • Edge and Enterprise Equipment. • Wireless Telecommunication Equipment in Access and Backhaul. • Telecom Antenna. • Open-RAN Equipment (Radio Unit, Distributed Unit, Centralised Unit, and RAN Intelligent Controller).
3	**Access & Customer Premises Equipment (CPE), IoT Access Devices and Other wireless**	• Unified Communications Platforms. ▪ IP Multimedia Subsystem. ▪ Soft Switch.

Sr. No	Product Category	Description of Goods
	Equipment	▪ GPON Optical Network Terminal (ONT). ▪ Wireless Fidelity (Wi-Fi) Access Point and Controller. ▪ LTE CPE. ▪ 5G CPE. ▪ Short Range Devices and Associated Electronics in new technologies like 4G/5G/Fibre To The Home (FTTH) etc. ▪ Internet Set Top Box. ▪ Satellite CPEs for accessing Internet. ▪ VSAT Equipment. ▪ NG-PON-ONT. ▪ Telecom modules of IOT/M2M Access Devices.
4	**Enterprise equipment: Switches, Routers**	• Switches. • Routers. • Internet protocol (IP) and Packet Switching and Routing Apparatus.

India's Department of Telecommunications (DoT) has approved a total of 42 companies, including 28 micro, small, and medium enterprises (MSMEs), under the PLI Scheme for Telecom and Networking Products as of October 31, 2022. 17 companies have applied for the additional one percent incentive under the design-led manufacturing criteria.

Such incentives will encourage both global and domestic manufacturers to enhance their manufacturing capacities in the country for catering to domestic and international demand. India is the second-largest telecommunication market and with telecom services providers moving towards 5G technology and new-age connected equipment, domestic manufacturing can play a pivotal role in setting up digital infrastructure in the country.

Many foreign companies have chosen to access the Indian market by developing a joint venture (JV) relationship with an Indian partner; it might make sense to

establish a partnership with enterprises that are already beneficiaries of key incentive programs. Moreover, the need to diversify supply chains requires businesses worldwide to expand their sourcing networks.

Altogether, the 42 companies have committed to investments worth INR 41.15 billion ($496.37 million). The government expects this to generate additional sales of INR 2.45 trillion ($29.53 billion) and create additional employment for more than 44,000 persons during the scheme period.

- **India PLI Scheme for Design-Led Manufacturing of 5G Products**

The federal budget for FY 2022-23 had proposed the basis for a Design-Led PLI scheme for telecom and networking products to create a robust domestic value chain in India. It would provide additional incentive of one percent over and above the existing incentives for products that are designed and manufactured in India.

The Design-led PLI Scheme was launched in June 2022 and applications were invited from design-led manufacturers, among others, to access incentives under the PLI Scheme for five years, commencing from April 1. 2022.

Existing beneficiaries under the PLI scheme for telecom and networking products were allowed to add more products and apply under the design-led PLI scheme. They were given the option to shift their five-year PLI Scheme period by one year.

22 companies have availed this opportunity of shifting their first year. Among them, 13 companies have applied as fresh applicants.

Table 4.5: Full list of approved applicants under the PLI Scheme for Telecom and Networking Products

S. No.	Name of the applicant
1	Alphion India Private Limited
2	Candid Optronix Pvt Ltd
3	Coral Telecom Limited
4	Design and Manufacturing Vista Electronics Pvt. Ltd.
5	Ehoome IOT Private Limited
6	Elcom Innovations Private Limited
7	Frog Cellsat Limited
8	GDN Enterprises Private Limited
9	GO IP Global Services Private Limited
10	GX India Private Limited
11	Huber + Suhner Electronics Private Limited
12	Kaynes International Design & Manufacturing Pvt. Ltd
13	Lekha Wireless Solutions Pvt Ltd
14	Matrix Comsec Private Limited
15	Netlink ICT Pvt Ltd
16	Netweb Technologies India Pvt. Ltd.
17	Panache Digilife Limited
18	Priyaraj Electronics Limited
19	Samriddhi Automations Private Limited
20	Sansap Technology Private Limited

S. No.	Name of the applicant
21	Sixth Energy Technologies Private Limited
22	Skyquad Electronics and Appliances Private Limited
23	Surbhi Satcom Private Limited
24	Synegra EMS Limited
25	Systrome Technologies Private Limited
26	Tecniqua India Private Limited
27	Tianyin Worldtech India Private Limited
28	Vihaan Networks Limited
29	Dixon Electro Appliances Private Limited
30	HFCL Limited
31	ITI Limited
32	Neolync Tele Communications Private Limited
33	Syrma SGS Technology Limited
34	Tejas Networks Limited
35	VVDN Technologies Private Limited
36	Commscope India Private Limited
37	Flextronics Technologies (India) Private Limited
38	Jabil Circuit India Private Limited
39	Nokia Solutions and Networks India Private Ltd
40	Rising Stars Hi-Tech Private Limited
41	Samsung India Electronics Pvt Ltd.
42	Sanmina-Sci India Private Limited

- **Champion service sector scheme (CSSS):**

Ministry of Commerce and Industry announced the scheme on 24.03.2021 with total amount of Rs.3369.75 Crore for 3-5 years based on the proposals submitted by the concerned Ministry/Department. Under the scheme, in 2020-2021, Dept. of Telecom was allocated Rs.15 Crore for their sectoral scheme 'Brand building of India as Telecom Manufacturing and Services Destination'. Another Rs. 44.5 Crore was allocated to DoT for Setting up of Digital Communications Innovation Square (DCIS). Under DCIS, the aim is to promote the ecosystem for research, design, development, proof of concept testing, IPR creation, pilot project and manufacturing i.e. complete value chain like 5G , AI, Block Chain etc. to make India a global hub for production of telecommunication equipment and a Centre for digital communication services.

The Department of Telecommunications (DoT) has approved 43 start-ups and micro, small and medium enterprises (MSMEs) for a grant of over Rs 50 crore to develop indigenous 5G equipment and technologies, preparing India for the roll out of 5G services i.e. for development of telecom technologies like 5G core, RAN, NMS, IMS, chipsets, devices, ICT solutions and applications enhancing deep tech, The list of approved organisations include BKC Aggregators, Coral Telecom, Wisig Networks, SASTRA University, Versatile Antenna Systems, amongst others.

The scheme provides start-ups with a funding of Rs 50 lakhs, while MSMEs get a grant of Rs 2 crore and a consortium get a grant of Rs 10 crore. Financial support is to be provided to those projects who have reached at least the proof of concept level.

4.17 Incentives for Procuring Telecom products manufactured in India:

- **PMI- PMA- Policy : Public Procurement Policy for Make in India (PPP-MII)**

India's decision to join the WTO's Information Technology Agreement I (ITA I) in March 1997, almost damaged its domestic manufacturing capabilities by permitting duty free imports of Telecom products.

TRAI 2011 recommendations defined Domestic manufactured products as products manufactured in India that meet the minimum value addition criterion prescribed in the policy. Domestic manufactured products were further categorized into either Indian Manufactured Products (IPR residing outside India) or Indian Products (IPR residing within India). It recommended that preferential market access should be provided to the domestic manufactured products (comprising both Indian Manufactured Products and Indian Products) in procurement by the Government and Government Licenses (service providers both public and private) as per tables below subject to the value additions proposed for the corresponding years.

PMA was notified by Department of Electronics and Information Technology (DeitY) vide Notification No. 8(78)/2010-IPHW on 10.02.2012. A Notification No. 8(78)/2010-IPHW dated 10.02.2012 was issued for providing preference to domestically manufactured electronic products as a part of procurement process for the electronic products that have security implications for the country and were to be utilized in Government own use while ensuring that no commercial resale is involved.

PMA policy was issued by DeitY, vide Notification No. 33(7)/2015-IPHW dated 16.11.2015. In furtherance of the Policy issued by DeitY on 10.02.12, DoT laid down the policy for providing preference to domestically manufactured telecom products in government procurement vide DoT's Notification No 18-07/2010-IP dated 05.10.2012. Further, value addition criterion for PMA to domestically manufactured telecom products was notified by DoT vide Notification No 18-07/2010-IP dated 11.01.2017.

In TRAI 2018 Recommendations Authority reemphasized Market access to domestic manufacturing and impressed upon appointing A Nodal Officer to be appointed in DoT/TEC to look into the cases related to lack of implementation of Preferential Market Access (PMA) policy issued by DoT. , to verify claims Value addition claims of each product should be verified independently, making PMA policy applicable for all public telecom networks to address the national security concerns and incentivizing Telecom Service Providers for deploying indigenous

telecom products, beyond the quantities to be mandated under the PMA, by giving them graded incentives.

Department for Promotion of Industry and Internal Trade (DPIIT) issued **PPP MII Order 2017** for ensuring preferential access to domestic manufacturers. The objective of the order was to encourage 'Make in India' and to promote manufacturing and production of goods, services and works in India with a view of enhancing income and employment. The Order was made applicable for procurement by the Ministry / Department / attached / subordinate offices, or autonomous body controlled by, the Government of India .

DoT issued Public Procurement (Preference to Make in India) order in August 2018 in reference to DPIIT order, for a list of telecom products, services and works for their purchase preference in public procurements from local suppliers, fulfilling Local Content (LC) criterion. DoT has identified conditions for the inputs to be qualified as Local Content and the Scheme mandates the preference to Local content in public procurement.

TRAI in its 2018 Recommendation had stated that '***Telecom Service Providers should be incentivized for deploying indigenous telecom products, beyond the quantities to be mandated under the PMA, by giving them graded incentives.'***

DoT has issued amendments in licenses in March 2021 for procurement of telecom Equipment from trusted sources w.e.f. June 15, 2021, for ensuring security of telecom networks. This mandates the telecom service providers to use the equipment through trusted or authentic sources only. It can help in addressing security concerns emanating from imported telecom equipment.

Government has issued Public Procurement Policy (Preference to Make in India) [PPP-MII] Order 2017 vide the Department for Promotion of Industry and Internal Trade (DPIIT) Order No.P-45021/2/2017-B.E.-II dated 15.06.2017 and subsequent revisions vide Order No. 45021/2/2017-PP (BE-II) dated 28.05.2018, 29.05.2019, 04.06.2020 and 16.09.2020 to encourage 'Make in India' and to promote manufacturing and production of goods and services in India with a view to enhancing income and employment. This Order is issued pursuant to Rule 153 (iii)

of the General Financial Rules, 2017. The salient features of the aforesaid Order are as under:

1. Three Classes of Local Suppliers are defined based on local content as per the revised PPP-MII Order dated 04.06.2020 issued by the Department for Promotion of Industry and Internal Trade (DPIIT) as given :
    - **Class-I Local supplier** - a supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50%.
    - **Class-II Local supplier** - a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%.
    - **Non-Local supplier** - a supplier or service provider, whose goods, services or works offered for procurement, has local content less than or equal to 20%.

      Only '**Class-I local supplier**' and '**Class-II local supplier**' shall be eligible to bid in procurement of all goods, services or works, and with estimated value of purchases less than Rs. 200 crore.
2. It is applicable to all Central Schemes (CS)/ Central Sector Schemes (CSS), for which procurement is made by States and Local Bodies, if that project or scheme is fully or partially funded by the Government of India including Universal Service Obligation Fund (USOF) projects.
3. In terms of clauses 2, 3 and 11 of PPP-MMI(Public private partnership under make in India) Order, the Department of Telecommunications has prepared a list of telecom products, services and works for their purchase preference from local suppliers for public procurement for ***Preference to Make in India*** (***PMI) and their Local Content (LC)*** The local supplier has to manufacture equipment from component level in India and also develop local vendors for procurement of raw materials, components and parts for increasing local content. The Department has identified conditions for the inputs to be qualified as Local Content and maximum ceiling for design as LC out of total LC.

In terms of clause 9(a) of PPP-MII Order, the local supplier at the time of tender, bidding or solicitation shall provide self-certification in **Form-1** specifying that the item offered meets the minimum local content and shall give details of the location(s) at which the local value addition is made.

4. Each identified products, services or works shall comply with the latest TEC GR/IR, if such GR/IR has been issued. The procuring entity may ensure that prior experience clause is not too restrictive to exclude all local suppliers of telecom product, services or works. All Procurement Officers may be required to certify compliance of this order before uploading tenders on Central Public Procurement Portal (CPPP). Disciplinary action will be taken against erring officers who insert restrictive tender conditions against local suppliers with mala fide intent or otherwise flout the provisions of PPP-MII Order.
5. In case a complaint is received by the procuring entity or the concerned Ministry/Department against the claim of a bidder regarding local content in telecom products, services or works or in case of a question whether an item being procured is a telecom product, service or work to be covered under the notification or any doubt in respect of telecom products, services or works, reference shall be made to Telecommunications Engineering Centre (TEC), Department of Telecommunications or technical auditor as accredited by the Telecommunications Engineering Centre (TEC), Department of Telecommunications, New Delhi.

4.18 Other Financial Incentives

i. Electronics Development Fund (EDF)

Venture capital (VC) is a form of private equity and a type of financing that investors provide to start-up companies and small businesses that are believed to have long-term growth potential.

Electronics Development Fund (EDF) is a venture capital fund by MeitY in the nature of 'fund of funds' to participate in professionally managed "daughter funds" which in turn provides risk capital to companies developing new technologies.

Setting up of EDF is one of the important strategies enabling a vibrant ecosystem of innovation and research and development. EDF was set up to provide risk capital to start-ups in Electronic System Design and Manufacturing and IT, leading to multiple Intellectual Properties creation/acquisition by Start-ups, supporting start-ups and companies working in IoT, Robotics, Drones, Autonomous Cars, Health-tech, Cybersecurity, AI/ML, etc. The objective of the EDF policy is to support Daughter Funds including Early-Stage Angel Funds and Venture Funds in Electronics System Design and Manufacturing (ESDM), Nano-electronics and IT.

ii. **Multiplier Grants Scheme (MGS)**

MeitY has implemented MGS which aims to encourage collaborative R&D between industry and academic/R&D institutions for development of products and packages. Under the scheme, if industry supports R&D for development of products that can be commercialized at institution level, then the government will also provide financial support that is up to twice the amount brought by industry. The proposals for getting financial support under the scheme are to be submitted jointly by the industry and institutions.

4.19 Institutional methods of funding

I. Project Financing: Project Financing refers to the funding of long-term projects, through a specific financial structure. Lending arrangements are based on the cash flow generation of the project. Finances can consist of a mix of debt and equity. Liability is limited to the contributed equity capital, and lenders often have limited recourse to project sponsors. The cash flows from the project enable servicing of the debt and repayment of debt and equity. In the telecom sector, apart from others, some of the USOF initiated projects can also fall under this category where the TSPs or their consortium can opt for project financing mode .

II. **Credit default insurance** is a financial agreement, usually a credit derivative, to mitigate the risk of loss from default by a borrower. Banks and debt capital markets are the two most common sources of debt financing for large corporations. Banks have a positive approach to

support all bankable manufacturing opportunities in the telecom sector. However, they are often reluctant to lend to MSMEs and start-ups with no established records of profitability. MSMEs suffer from Commercial banks fear default risks hence often do not want to provide easy credit to small enterprises with no track record. A lender/borrower risk of investment is reduced by shifting all or a portion of that risk onto an insurance company. National Credit Guarantee Trustee Company Ltd. has been set up by the Department of Financial Services, under Ministry of Finance, to function as a common trustee company to manage and operate various credit guarantee trust funds. The objective is to nurture the start-up ecosystem and give a boost to the small and medium enterprises in the country. The Credit Guarantee Scheme for Micro and Small Enterprises (CGS) was launched by the Government of India (GoI) to make collateral-free credit available to the micro and small enterprise sector

III. **Interest Equalization Guidelines for telecom manufacturer exporters.**

Interest equalization guidelines refer to policies implemented by governments to provide financial assistance to exporters. These policies typically involve offering subsidies or lower interest rates on loans to exporters to help them remain competitive in the global market. Launched in 2021 it has been extended up to March 2024 for Pre and post shipment credit for MSME exporters, who have not availed PLI scheme benefit.

For telecom manufacturers who are also exporters, there are some guidelines to be followed by Exporter like making sure familiarity with the rules and regulations for exporting from this country for obtaining necessary licenses or certifications, complying with trade agreements or embargoes, and meeting quality standards., developing a strong business plan that outlines your export strategy and identifies potential risks and challenges with a clear understanding of the target markets, pricing strategies, and marketing plans, identifying potential financing sources,

including government-backed loan programs or private sector banks that specialize in export finance and insurance .,research on interest rates, repayment terms, and monetary currency fluctuations impacting the business .

IV. Export Credit Guarantee Corporation (ECGC) scheme was formulated to provide insurance protection to Indian exporters against payment risks by offering several types of insurance covers. Over the years the Export Credit Guarantee Corporation of India has proved to be useful to Indian exporters. It pays 80% to 90% of the loss incurred by Indian exporters. The remaining 10% to 20% of the loss alone has to be borne by the exporters. Since the exporter industries for Network and telecom Manufacturing is in a very nascent stage as of now, it can be argued that a dedicated scheme, along above lines, may be helpful to mitigate the risk for exporters of the sector.

4.20 India's National Single Window System for Business Approvals

Govt. has developed single window software to connect central ministries, states and sectors to simplify the process of applying for regulatory approvals and compliances by serving as a one-stop shop to set up and start business anywhere in India. 27 central Ministries and 19 states are connected for 250 central approvals and 2500 state approvals .For ease of doing Business Right of Way (RoW)Policy has also been simplified so that infrastructure development, OFC laying etc. is facilitated easily.

4.21 Telecom Equipment and Services Export Promotion Council (TEPC)

Telecom Equipment and Services Export Promotion Council (TEPC) has been set up by the Government of India in Khurshid Lal Bhawan Janpath New Delhi to promote and develop export of telecom equipment and services from India. The Council caters to the complete Telecom Ecosystem including Telecom Hardware

Manufacturers, Telecom Service Providers, Telecom Software Vendors and Consultants.

TEPC vision is to encourage both private and overseas Investments in India under Foreign Direct Investment, Encourage Strategic Alliances, MOUs, and technical/Financial collaborations to boost trade and Support local IPRs & R&D activities for Design in India and making of World Class telecom products

4.22 RESEARCH & DEVELOPMENT –POLICIES &PLAN

I. C-DOT- Centre for Development of Telematics

Centre for Development of Telematics (C-DOT) is the main R&D Centre for development of telecom equipment in the country. Academic institutions like the IITs and other public & private sector organizations are also involved to some extent. Though, indigenously developed switching technology has greatly improved the telecom network and connectivity, indigenous R&D could not keep pace with the rapidly changing telecom technologies. Rapid changes in telecom technology, short life cycles of products, lack of indigenous components, slow up gradation of hardware and non-adherence to targeted time-frames are nullifying the efforts and achievements of indigenous R&D. In the absence of indigenous technology, manufacturing units are importing SKD/CKD (semi knock Down/ completely knock Down) kits for manufacturing of telecom equipment from foreign suppliers. Government policy has been to promote develop and strengthen the telecom manufacturing within the country.

- **Achievements of C-DoT are as given:**

MAX-NG - Migration of C-DOT-based fixed-line technology to packet-based Next Generations Networks (NGN). The technology helped BSNL to extend the life of legacy networks based on C-DOT circuit-switched technology and provide services of the next generation's networks

- GPON (Gigabit Passive Optical Network) indigenous development, useful for the broadband delivery over Optical Fibre Cable (OFC) network

catering to high bandwidth solution for the business applications in Metros and e-governance solution in rural areas

- SG-RAN (Shared GSM Radio Access Networks) technology allows mobile active infrastructure sharing to give affordable mobility to rural India thereby expanding the telecom penetration to rural sector.

- C-DOT ATM technology customization / adaptation for defence applications caters to requirements of strategic sector like naval programs for setting-up on board communication network completely based on indigenous technology.

- CMS (Centralized Monitoring System) technology caters to the requirements of security management for law enforcement agencies for interception, monitoring, data analysis /mining, anti-social-networking using the country's telecom infrastructure for unlawful activities. These technology programs as well as on-going technology enhancements of the deployed technology are yielding desired commercial results more during last decade.

Unlike the leading telecom equipment manufacturers such as Huawei, Nokia and Ericsson, who have large teams and invest billions of dollars in R&D, C-DOT achieved this feat with an annual budget of Rs 400 crore and a small team of 200 workings exclusively on 4G/5G.

C-DOT has indigenously designed and developed the 5G Non-Standalone (NSA) Core which is backbone of 5G networks establishing reliable, secure connectivity to the radio access network from where end users are connected and provides access to its services to users. Core is the heart of the overall 5G network and needs to be fully secure and robust. It handles essential functions in the mobile network, such as connectivity and mobility management, authentication and authorisation, subscriber data management and policy management, among others.

C-DoT developed 5G e-Node has been installed by BSNL in Chandigarh through Telecom Centre of Excellence (TCOE).

II. Telecom Centres of Excellence (TCOE)

Telecom Centres of Excellence, set up in Public Private Partnership (PPP) mode, are an example of the Government, the Academia and the Industry working together for the sustained growth and progress of the country in the Telecom sector. The idea of Telecom Centres of Excellence was initiated with the shared realization, by the Government and the Telecom Industry, that boosting the growth of telecommunications was essential for the overall progress of the country. It was conceptualized in May 2007 and brought into existence by February 2008 with the signing of 7 MoUs between DoT, participating premier Academic Institutes and the sponsors from the Telecom Industry. The eighth TCOE with participation of Railtel came up in Jun 5th 2013.The TCOEs set up in Public Private Partnership (PPP) mode, are an excellent example of the Government, the Academia and the Industry working together for the sustained growth and progress of the country.

TCOEs are created for promoting development of new technologies, to generate IPRs incubate innovations and promote entrepreneurship to position India as a global leader in telecom innovation and making India a hub of telecom equipment manufacturing. TCOE were set up with the sole idea of promoting Research and Development and for promotion of entrepreneurship and innovation aspects in the ICT and Telecom sector. TCOEs have opened up their research platform to all the stakeholders of ICT sector for enabling industry driven research through a competitive process. For this purpose, a TCOE may have collaboration with other academic institutions and funding for the projects would be accessed from Government, industry and VCs etc. on competitive basis.

The purpose(s) of the Society is:

a) Realizing the objectives of the National Digital Communications Policy of the Government of India;

b) Creating an environment of innovation in Telecom through Scientific Research and Development;
c) Creating Synergies among the academia, industry and research institutes for capacity building and development of a balanced telecom ecosystem;
d) Think tank activities for policy regulation and governance advocacy in the field of telecom for the benefit of the common people;
e) Steering the Start-ups to become globally competitive by participating in Standards Development at Telecommunications Standards Development Society, India ("TSDSI") in order to influence Global Standards; and
f) Promoting new and emerging technology changes based on the priorities of the Government.

TCOE India invited applications under the scheme named DCIS (Digital Communication Innovation Square (DCIS) under Champion Services Sector Scheme (CSSS)) on behalf of Department of Telecom (DoT) in year 2021 and 2022 and selected 43 Start-ups for incentive scheme.

TSDSI Telecommunications Standards Development Society, India

The Indian Telecom Industry, comprising operators and manufacturers, Academia and R&D organizations came together to form Telecommunications Standards Development Society, India (TSDSI) on 7 January 2014, as an embodiment of the Govt.'s resolve, expressed in the National Telecom Policy 2012 (NTP 2012), to create an Indian Telecom Standards Development Organization (TSDO), for contributing to next generation telecom standards and drive the eco-system of IP creation in India, formally recognised by the Government.

- Develop standards for access, back-haul, and infrastructure systems, solutions and services that best meet India specific Telecom/ICT needs, based on research and innovation in India. It works with global standards' bodies to reflect Indian requirements into international telecom/ICT standards in encouraging generation of Indian IPRs in this technology intensive field and get them incorporated into international standards. This in turn promotes indigenous research, product development and

manufacturing. Department of Telecommunications & Ministry of Electronics and Information Technology, Govt. of India are jointly supporting TSDSI as India's Telecom/ICT. It is Standard Developments Organization SDO and it has developed Policy for IPR Rights. Copyright Policy for Software and Anti –Trust Policy so that Indian Manufacturers are protected. It is working

Though these efforts India has been ranked 44th position in Global Intellectual Property (IP) Index out of 55 Countries .It is working on oneM2M, 3GPP, 5G NR standardization.

III. TEC Telecom Engineering Centre

TEC is a technical body representing the interest of Department of Telecom, Government of India. TEC is committed to develop Standards and Specifications for cutting-edge technologies in Telecommunication and related ICT systems to be deployed in India and to promote development/ upgradation of ubiquitous, resilient and state-of-the-art quality infrastructure by testing and certification.

The Indian Telegraph (Amendment) Rules, 2017, provides that every telecom equipment must undergo prior mandatory testing and certification. The detailed procedure for Mandatory Testing and Certification of Telecom Equipment (MTCTE) under these rules are notified by Telecom engineering centre (TEC) of Govt. of India. The testing is to be carried out by Indian Accredited Labs and based upon their test reports, certificate shall be issued by TEC. The instruments are related to Transmission, Radio, Fibre Optics, GPON, Telecom Switching, Next Generation Networks, Mobile Networks, Information Technology, IoT.

Type Approval and Interface Approval of telecom products against TEC issued Generic Requirements (GRs) and Interface Requirements (IRs) are given by TEC after due testing procedure.

Also, Internet Protocol Version 6 (IPv6) Lab setup by Telecommunication Engineering Centre (TEC) has earned a unique distinction of being approved by IPv6 Ready Logo Committee under IPv6 Forum which is an international body. This

achievement is significant for TEC and the country, as very few other labs in the world have achieved this milestone. India has thus joined Europe and a select group of countries, which include USA, Japan, China, Taiwan, France and Korea. This test lab caters to Conformance as well as Interoperability testing of various software/ equipment, which have implemented IPv6. It has also the capability of examination of test results sent by other IPv6 Ready Logo approved labs. Major IT/telecom products being used across markets are primarily based on global standards. The mobile/ broadband devices and network infrastructure products are based on global standards of Internet of Things, 5G Cloud Computing, Quantum Computing Artificial Intelligence, Big Data, and Blockchain. Harmonization of these standards to work across networks is critical. India being a large market for such products, it may therefore be necessary that India specific requirements / specifications are incorporated considering our local needs. In view of the same, need for domestic specification factoring these requirements in the national standards becomes critical.

The equipment Testing Labs have been setup in large scale i.e. total 62 Labs now all over India so that Public & private companies can avail that facility on lease or payment basis for their manufactured telecom Products.

Whereas TCOCE has worked through Standards Development at Telecommunications Standards Development Society, India (“TSDSI”) in order to influence Global Standards standardized Anti-Trust Policy Software Policy, IPR policy in Telecom sector, Telecom Engineering Centre TEC has worked for standardization of telecom hardware specifications and GR Generic requirement.

Telecommunication Engineering Centre, New Delhi, under Department of Telecommunications (DoT), which, inter alia, is the Telegraph Authority for the purpose of Testing and Certification. . The testing is to be carried out by Indian Accredited labs and based upon their test reports, certificate shall be issued by TEC.

IV. TTDF - Telecom Technology Development Fund

Universal Service Obligation Fund (USOF), a body under the Department of Telecommunications, officially launched Telecom Technology Development Fund (TTDF) Scheme on October 01st, 2022. Telecom Technology Development Fund (TTDF) aims to fund R&D in rural-specific communication technology applications and form synergies among academia, start-ups, research institutes, and the industry to build and develop the telecom ecosystem. Additionally, the Scheme aims to promote technology ownership and indigenous manufacturing, create a culture of technology co-innovation, reduce imports, and boost export opportunities and creation of Intellectual Property. Under the scheme, USOF is also targeting to develop standards to meet countrywide requirements and create the ecosystem for research, design, prototyping, use cases, pilots, and proof of concept testing, among others. The scheme entails grants to Indian entities to encourage and induct indigenous technologies tailor-made to meet domestic needs.

4.23 Study for Telecom Manufacturing Company in India – PSU and Private Sector

1. INDIAN TELEPHONE INDUSTRIES LTD- PSU

ITI Limited was established in 1948 and is the first PSU of Government of India, with the vision of attaining self-reliance in the field of Telecommunication needs of the Country. The Government of India holds majority equity stake in the Company. ITI has its Registered & Corporate Office located at Dooravaninagar, Bangalore.

The company has large manufacturing facilities at six locations in the country - Bangalore (Karnataka), Naini (UP), Palakkad (Kerala), RaeBareli (UP), Mankapur (UP) and Srinagar (J&K).

The financial year 2020-21 has a turnover of Rs. 2578 Crore with Networth of the Company at Rs. 2420 Crore with order book of around Rs. 9820 Crore. ITI has signed contract with Ministry of Defence to execute ASCON Phase IV project which is worth Rs. 7796 Crore. ITI has a contract with Indian Air Force for upgradation of their IT facilities in 10 months which is worth Rs. 414 Crore including AMC, another

Bharat Net project from BBNL worth Rs. 37 Crore to provide optical broadband network in the Andaman & Nicobar Islands. It has advance purchase order for a package in TANFINET project worth around Rs. 498.52 Crore. ITI has received an order from a private operator for FTTH rollout worth around Rs. 55 Crore. ITI has tenders from defence forces for the 5G technology network implementation and have also addressed RFP for setting up a 5G test bed. Gujnet project execution has been almost completed. NFS project is planned to be completed by the year end. .It has already supplied 10433 KMs of HDPE duct for the BharatNet project being executed by the Company, also manufactured nearly 9,000 KMs of HDPE for the ASCON Phase IV project manufactured 20,000 solar panels for the MahaIT project. OFC supplies for ASCON Phase IV project is also being planned from in-house manufacturing planning to see that the manufacturing facilities of HDPE, OFC, Solar Panels, and Wi-Fi Access Points are made operational 24 X 7 basis by exploring more business leads for these products. also focusing on initiatives for marketing ITI products like Micro PC, Smart Banking Cards, SPDS (Smart Parcel Delivery Systems), UVDS(Ultra Violet Disinfection Systems), Digital Mobile Radio (DMR), Anti Drone Systems, IRNSS Receivers, E/V Band Radios, EVM etc.

Company has been exploring in the areas of 4G/5G, Cyber Security, AI, Smart Devices, and Cloud Services etc. Company has tied up with TCS for addressing the 4G Tender of BSNL. The same is being carried out at Ambala, Haryana. ITI plans to offer Cloud Services from the ITI Data Centre which is augmented with additional capacities has tied up with a start up which has AI based solution for testing infectious diseases including COVID and also Block chain based solution for Electronic Medical Record System. Through partnerships with Indian companies, the Company is trying to reduce dependency on import of Telecom equipment and also build a native strategic platform for networks including defence communication. A PSU joining hands with leading private sector companies shows the commitment of ITI towards the Aatmanirbhar Bharat initiative of Government of India. Company has established 120-seater Start-up hub at ITI Bangalore plant and plans to expand it to 1000-seater capacity. Many start-ups working in the areas

of IoT devices, Medical Electronics, Home Automation, and Aeronautics are operational from this hub. EMI/EMC & Safety Labs set up in collaboration with TEC are operational. Further, establishment of Security Lab is also planned. ITI has created Six Training Centers (TCs) at all the plants of ITI including a Smart Skill Development Centre at Srinagar Plant to promote the Skill India Mission. The expanded Data Centre of ITI is ready to launch the Cloud based services and would help many companies to store data in a secure manner. Company has taken number of initiatives on improving business prospects by transformed strategy for manufacturing, marketing and management of projects.

2. Sterlite Technologies Ltd - STL – Indian Multinational Telecom Company

Sterlite Technologies Limited is an Indian multinational technology company, headquartered in Mumbai. It is listed on Bombay Stock Exchange and National Stock Exchange of India. It has 636 patents and is active in over 150 countries. STL has a strong global presence in India, Italy, the UK, the US, China, and Brazil. It registered the revenue of Rs 5,754 crores and a robust order book of Rs 11,639 crores in FY 2021-22.

STL is a leading global optical and digital solutions company providing advanced offerings to build 5G, Rural, FTTx, Enterprise and Data Centre networks. The company, driven by its purpose of 'Transforming Billions of Lives by Connecting the World', designs and manufactures in 4 continents with customers in more than 100 countries. Telecom operators, cloud companies, citizen networks, and large enterprises recognize and rely on STL for advanced capabilities in Optical Connectivity, Global Services, and Digital and Technology solutions to build ubiquitous and future-ready digital networks. STL's business goals are driven by customer-centricity, R&D and sustainability. Championing sustainable manufacturing, the company has committed to achieve Net Zero emissions by 2030.

To give a boost to Indian government make in India initiative, STL recently invested in 5G assembling an ecosystem of partners.

It has the first optical fiber cable plant in India to receive zero waste to landfill certification.

Sterlite in the last few years, have evolved business from a manufacturing-led model for passive connectivity products to an integrated portfolio of products, services and software to enable smarter networks for their customers. With these new capabilities, they are now uniquely positioned to engage with their customers at the network design stage and become their trusted partners for end-to-end rollout and post execution management to deliver best-in-class network performance. Today, they design, build and manage smarter networks.

Company state-of-the-art Centre of Excellence in Aurangabad is one of its kinds globally and focuses on advanced fibre-optic research, which has resulted in a strong patent portfolio of 146 across geographies. It recently opened Centre for Smarter Networks in Gurgaon, for building advanced technologies, fibre-enabled solutions for 5G networks, pre-connected fibre-kit solutions to bring cutting-edge solutions for next-generation networks.

Their focus on technology innovation and continuous process improvements to drive efficiency position us to build an extremely strong supply base. Sterlite manufacturing facilities in India, China and Brazil are world-class centres.

India's Department of Telecommunications (DoT) now allows for active and passive infrastructure sharing, a move expected to help operators reduce capex costs. Sterlite, as a leading operator has already started to reap the benefits of the modified rule.

The above trends demonstrate that the global telecom industry is changing at a rapid pace. Sterlite Tech are investing in technologies, such as 5G, IoT, Cloud, SDN and NFV to offer future-ready products to our customers.

CHAPTER 5: ANALYSIS, ISSUES and CHALLENGES

5.1 Responses to Questionnaire

An online survey was conducted and respondents included various stakeholders both in public and private sectors as well as to manufacture associations. Specifically these were BSNL, MTNL, ITI, STERLITE, officials, Department of Telecom officials, TRAI, TEC, TEPC, TSDSI, and Other OEM association members, TEMA (Telecom equipment Manufacture Association). The data thus collected in response to Questionnaire (Annexure-A) has been analysed and key points that emerge have been summarised as under:

i. A majority, 61% of respondents, opined that appropriate Tax incentive, R&D promotion and FDI in telecom sector will boost domestic manufacturing in telecom sector.
ii. 66% respondents viewed that Domestic manufacturing of equipment will ensure security of critical data of telecom network of Telecom Service Providers.
iii. 65% respondents attributed the lack of R&D and Standardization as a major reason of hindering large scale manufacturing of telecom equipment in India.
iv. 43% respondents opined that India could increase international trade in telecom sector as a result of proactive policies of Government like PLI and Ease of Doing business.
v. 28% respondents opined that PLI/DLI scheme is suitable for Telecom /IT sector.
vi. 31% respondents suggested extension of PLI schemes beyond 2025 for promotion of indigenous R&D in Telecom Manufacturing sector.
vii. 28% respondents viewed that MNC have setup telecom equipment manufacturing base in India, with or without joint venture, and it will lead to transfer of Technology and IPR creation.

viii. 39% respondents attributed large imports of telecom goods to lack of quality products. 39% respondents suggested that innovation and R&D for Local manufacturing required for boosting Start-ups.

ix. 39% respondents opined that more financial incentives are needed to promote make in India in Telecom sector.

x. 16% respondents agreed that Financial Incentives/Loan schemes to Service Providers have been effective for deployment of Telecom products under Make in India in Domestic service sector.

xi. 18% respondents recommended to boost Start-up companies through Champion Service Sector Scheme under DCIS Digital Comm Innovation Scheme. This will improve the eco-system for R&D.

xii. 23% respondents expressed satisfaction with Standardization of Telecom products/services set up by TEC and standardization of IPR policy, Software Copyright Policy and Anti-Trust policy of TSDSI.

xiii. 26% respondents believed that that eco-system for domestic manufacturing of Telecom sector has improved considerably during last few year, particularly in 5G technology roll out activities.

xiv. 23% respondents opined that PMA/PMI Preferential Market Access/Procurement under Make in India, where stress is on purchase of Telecom products with make in India content or value addition and local manufacturers are being given preferential treatment, will be effective.

xv. 41% respondents believed that with the setting up of Silicon Chip manufacturing facility in Gujarat and discovery or significant deposit of rare metal Lithium in J & K, India stands a good chance of becoming Manufacturing hub of Electronics/Communication items in near future.

xvi. 27% respondents opined that C-DAC, C-DOT, ITI Ltd and TCIL have done tremendous contribution in manufacturing and deployment of domestically manufactured products in BSNL and other private Service providers by developing indigenous 4G solutions, 5G Core network and in implementing lucrative projects in IT, Telecom, Defense, Railway and State govt.

5.3 POSITIVE EFFECTS OF MAKE IN INDIA INITIATIVE IN THE FIELD OF TELECOMMUNICATIONS

Due to visionary and congenial policies of Government of India, pace for Make in India in the field of Telecommunication has accelerated. Some of noteworthy developments are as given:

i. The total incentive for smartphone PLI was Rs 5,334 crore in Financial year 2021. The threshold for qualifying for the incentive was incremental sales of Rs 4,000 crore and maximum Rs 15,000 crore. Samsung mobile attained this target and claimed for Rs 900 crore (6% of Rs 15,000 crore) incentives in FY2021. Incentives worth Rs 357.17 crore was approved for Apple maker Foxconn in FY 2022. Domestic Company Dixon's Padget has approval for incentives worth Rs 58.29 crore for the January-March 2022 quarter after receiving worth Rs 53.28 crore for the August-December 2021 period. Apple has become the first company from India to export smartphones worth $1 billion (₹8,100 crore) in the month of Dec 2022. Mobile exports from India is Rs 45000 crore in year 2022 and target of mobile export for FY 2023 is fixed for over Rs 1 lac crore.
ii. As of September 2022, the PLI scheme for Large-Scale Electronics Manufacturing (LSEM) has attracted investment of ₹4,784 crore, and led to a total production of ₹2,03,952 crore, including exports of ₹80,769 crore. The scheme has also created 41 thousands jobs. Now, more than 99% of mobile phones used in India are made locally. This is significant, given that 99 % mobile phones were imported five years ago.
iii. Under PLI in Telecom Sector As per Provisional data on 31 Dec 2022 the Investment has been up to Rs 1060 Crore, the sale has been Rs 11700 Crore under this PLI scheme. MNCs and India Companies have started manufacturing of Telecom Products within India and GX Telecom Pvt Ltd , leading GPON manufacturer for Telecom Gears , is first one to receive cheque from DoT under this incentive scheme recently.
iv. Export of a lot of Telecom Equipment especially radio equipment has started from India in the last 7-8 months even to USA. The Open architecture was

approved for Radio Access Networks (RAN) work and Indian Manufacturers are excelling in RAN production for mobile network for 4G/5G network.

v. In July 2022 Sufficient spectrum for Mobile service 72.098 GHZ has been made available out of which 51.236 GHZ has been allocated to Telecom service providers TSPs crore with bid amount of Rs 1,50,173.29. Reliance Jio picked up 24. 740 GHz of airwaves across the 700 MHz, 800 MHz, 1800 MHz, 3300 MHZ, and 26 GHz bands, shelling out Rs 88,078 crore. India's second largest telco Bharti Airtel picked up 19.867 GHz of spectrum across 900 MHz, 1800 MHz, and 2100 MHz, 3300 MHz, and 26 GHz bands. Its total spending in the auction was Rs 43,084 crore. Vodafone Idea, bid for spectrum amounting to Rs 18,799 crore, picked up 6.228 GHz of airwaves across 1800 MHz, 2100 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands. New entrant Adana spent Rest 212 core to acquire 400 MHz in the 26 GHz band. The bidders have the option to make the payments in 20 equal instalments over the next 20 years (which is also the duration of the right to use spectrum acquired in the auction). The first instalment in case everyone opts for the option would amount to Rs 13, 365 crore.

vi. Vedanta is setting up a display manufacturing unit with an investment of 945 billion rupees ($11.95 billion) and separate chip-related production units by investing 600 billion rupees ($7.58 billion), both totalling Rs 1, 54 Tr with over One lac employment opportunities.

vii. Singapore-based IGSS Ventures has announced plans to invest ₹25,600 crores ($3.25 billion) in Tamil Nadu over the next five years to set up a semiconductor fab unit and a high-tech semiconductor park.

viii. International semiconductor consortium ISMC , a joint venture between Abu Dhabi-based Next Orbit Ventures and Israel's Tower Semiconductor (Now acquired by Intel USA),has submitted plan to invest $3 billion in a chip fab in Karnataka.

ix. Polymatech Electronics, India's sole semiconductor chip manufacturer, is set to start the mass production of advanced semiconductor components in India for 5G and 6G applications with investment of US$ 1 billion by 2025. Currently, in the testing phase, Polymatech will start to manufacture the chips at the

company's main manufacturing plant in Kancheepuram, Tamil Nadu. Semiconductors from Polymatech will not only reduce the procurement cost of components for telecom companies but also achieve low power loss and increased efficiency. With this, India will become only the third country in Asia after South Korea and Taiwan to manufacture 5G and 6G components. The company is already into field of Microcontroller, Integrated Circuits. Logic Chips. Other Products. Memory Chips. Touch Panels, Diodes. Sensors, LCD, Light Emitting Diode. Photovoltaic Cells.

x. Kotur-Balur Industrial Area in the Dharwad District of Karnataka under EMC 2.0 scheme, with Rs 180-crore worth of electronics manufacturing cluster is expected to catalyse investments to the tune of over Rs 1,500 crore with 9 companies, including start-ups, have already committed to making investments there.

xi. ELEST to invest Rs 24000 Crore in, Hyderabad Telangana for Display FAB HUB for Advanced AMOLED display for TV, Mobile, Tablet PC.

xii. India has acquired 100 patents in 6G Technology till now .India has got 42 position for the International Intellectual Property (IP) Index for 2023 in 55 global economies. India's accession to the WIPO Internet Treaties, the agreement to initiate a Patent Prosecution Highway (PPH) with international offices, providing IP incentives through governments programs such as Startup101, Make in India, etc. for budding business and its efforts towards streamlining and digitizing the IP filing and prosecution process has reflected in this rank jump

xiii. 5G services have been launched in over 300 cities of India by Jio, Airtel and Vodafone. BSNL is going to install 1 lakh 4G sites of 4 G services all over India within next 18-24 months by BSNL through Tata owned TEJAS Network. The government has also reserved spectrum in the 600 MHz, 3300 MHz and 26 GHz band for BSNL for 5G services to be launched in 2025 after roll out of 4G services in 2024 by BSNL. USOF has funded project for saturation of 4G mobile services in 24680 uncovered villages in remote and difficult area in India including Maharashtra.

xiv. Center for Development of Telematics (C-DoT) and Reliance Jio Infocom Ltd have developed indigenous 4G/5G technology stack. The Proof of Concept of C-DoT's .4G technology stack has been successfully carried out in BSNL network.

xv. The Department of Telecommunications (DoT) plans to extend a pilot project by fibre-to-home (FTTH) broadband connections in rural areas to cover 500,000 households as 200,000 connections have already been provided. The government is utilising BharatNet optical fibre network in collaboration with BSNL .So far, 198,408 gram panchayats have been connected through the BharatNet project and 613,868 km of optic fibre cable have been laid.

xvi. In 2022-23, out of 55.56 Crore Grant through CSIS Scheme Govt released 26.2 crore for 64 Pilot projects of Startup and 22 pilot projects were created and 15 IPR were created in Telecom sector. India has acquired 100 patents in 6G Technology till now. India jumped one notch up to attain the seventh position among top recipients of foreign direct investment (FDI) in calendar year 2021 as per UNCTAD data

xvii. In India exists digital public infrastructure (DPI), a unique partnership between governments (Union and States), regulators, the private sector, selfless volunteers, startups, and academia/think tanks and key components of DPI in India – Aadhaar, Digital Locker, Bharat Bill Payment System (BBPS), Unified Payments Interface (UPI), and National Knowledge Network (NKN) and its their usage. The ambitious goal of becoming a USD 5 trillion economy by 2025 fir India is realizable through these developments.

xviii. Through these effects The export of exports of Telecom Sector has increased from 1.2 Billion $ in 2017-18 to 8.25 Billion $ in 2021-22 whereas Import of Telecom sector has decreased from 23.2 Billion $ to 17.6 Billion $, Still there is huge gab between export and import and there is need to emphasize more for Make in India.

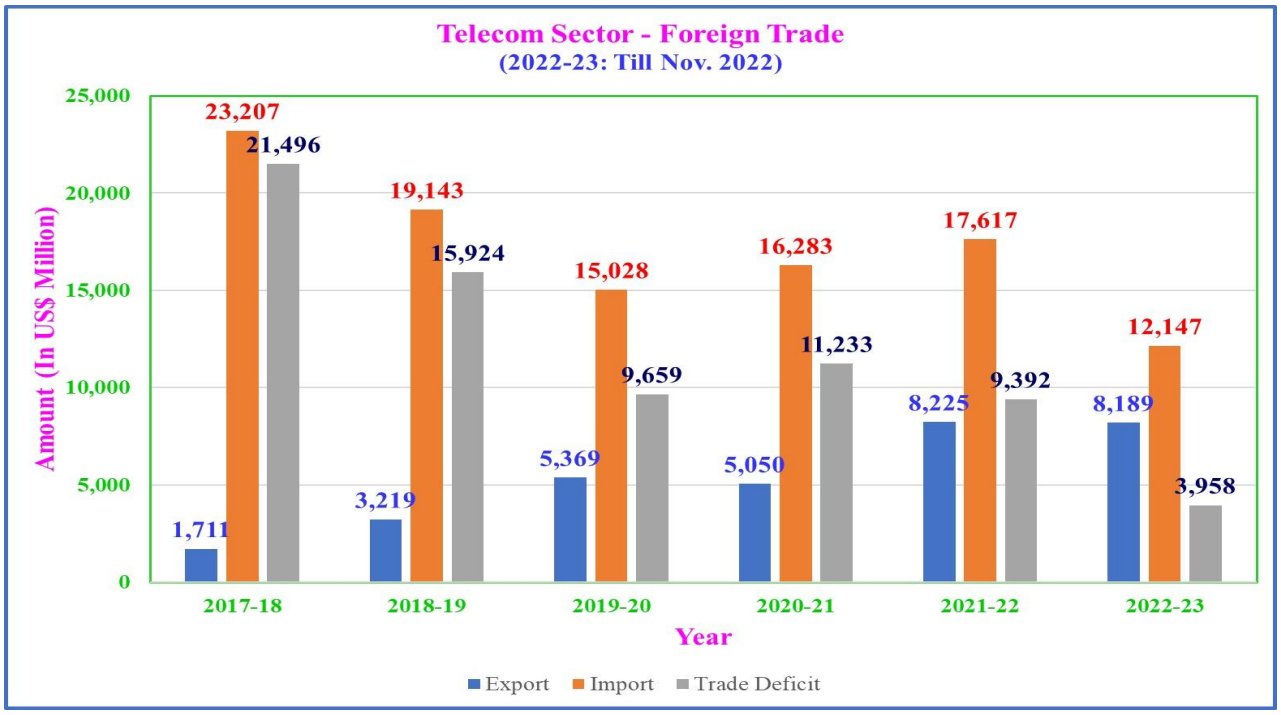

Figure 5.1: Telecom Sector – Foreign Trade (TEPC)

5.4 LIMITATIONS OF MAKE IN INDIA INITITIVES in PLI /DLI SCHEMES AND PMA POLICY

1. Many manufacturers have demanded that PLI scheme should be delinked from Investment as these companies have capacity to achieve the Manufacturing target with available goods and infrastructure and they want Incentives amount to be increased so that they can also avail its benefits

2. PLI scheme's architecture is for manufacturing of 'goods', and software is not covered under the specified list of telecom products whereas Software and its design is important part of product .PLI scheme is based on investment thresholds and increase in net sales. This may not serve the needs of small start-ups looking for seed funding or companies who are in the expansion stage or companies in R&D space

3. Stakeholders have stated that the current PLI and PMI policy are limited for hardware/ physical products manufacturing only and Software has been treated as an overlay sub-product. Treatment of 100% Software solutions as a separate product has not been considered. There may be instances where 100% software solutions will be competing with hardware solutions in the converged world. For example, cloud-based solutions could be competing with physical solutions in 5G. the Public Procurement (Preference for Make in India) Order (2017), has described hardware design and software design and development among the main inputs/stages in telecom manufacturing. This notification also specified the conditions for these inputs to be qualified for PMI - (i) the IPR resides in India for the hardware design; and (ii) the copyright for the software design and development is in India.

4. USOF tenders element-wise compliance of Local Content as per the DOT notification is not monitored as low value addition components like tower erection, civil work, installation charges, AMC charges etc. are construed as local value addition to take benefits under PPP-MII Order 2017 as these

infra items are having high value in total site pricing. Therefore, the actual benefit of the PMI scheme for domestic equipment manufacturing is not getting extended. Also the local value addition at the Project level like the cost incurred for local sourcing of material for Network Rollout, spares cost, warranty, AMC etc. are not getting captured. Similarly main inputs/ stages cost incurred on assembly/ testing/ integration and other necessary requirements for deploying the equipment in the network is not being considered.

5. Large global players who are locally manufacturing in India, have argued that the high threshold of value addition criteria adopted in some of the PMA based Request for Proposals (RFPs), acts as a barrier for them.

6. PMI policy in telecom is defined at the product level and not at the manufacturer's level. There are challenges around the existing methodology of calculating local value addition norms as in view of the large number of products and their scalability, telecom manufacturing facilities tend to be in 'nodes' where a few products are manufactured on a global scale and exported to meet global demand. Due to the inability to create scale, no entity can manufacture the entire bouquet of its products in one geography. However, tenders insist on all products from one OEM. Indian SMEs not having all the subsystems required for a project, are left out from participating. Large global players who are locally manufacturing in India, have argued that the high threshold of value addition criteria adopted in some of the PMA based Request for Proposals (RFPs), acts as a barrier for them.

7. In India, about 90% of the total number of wireless subscribers are served by the private telecom service providers Jio, Airtel and Vodafone leaving only 10% of subscribers who are served by PSU telecom service providers BSNL and MTNL . Though the Indigenous products get preference in public purchases under the PMI orders of DPIIT, there is no such policy support to either incentivize or mandate private telecom service providers to buy indigenous products. Private Telecom Service

providers requirement should be met by Indian manufacturers through an opening to incentivize the domestic telecom service providers to procure their equipment from domestic manufacturers.

8. The performance of PLI Scheme for IT Hardware in field of Laptop PC/Servers has not been encouraging as actual investment has been far below than Projected investment of Rs 2500 Crore due to sharp shipment decline in the global PC market etc. Dell and Dixon were able to claim the incentive at the end of first year, while Wistron, Flextronics and Rising Star were not able to meet the incremental production and sales targets.and the process has been started to re-launch it with double incentives with Rs 20,000 crore outlay as PLI scheme 2.0 for IT hardware for investment and production.

5.5 Other Challenges and Opportunities

The deployment of advance technology equipment has become a major security concern as simple clearance is no longer enough to certify security aspect of telecom gears which have been manufactured in India by global company through complex and high end technology as some malware etc. maybe there which escapes interception in simple testing/certification process. So international level labs and the creation of a full-certification centre are required within India for ensuring security of the system by checking all parameters of the equipment at one place in India before its deployment .

While PMA addresses the demand side challenges of Telecom industry for sale and deployment of domestic Telecom Equipment; National Manufacturing Policy, National Telecom Policy, and National Electronics Policy tackle the supply side bottlenecks of Telecom Equipment including capital expenditure, research and development, physical infrastructure, etc. PMA in this context is part of a policy mix and cannot yield successful results as a standalone initiative. PMA does not represent a reversal of India's economic reforms; it is more promotional than protectionist in nature. It is in line with the local content requirement policies adopted by different countries to address domestic priorities. Progress in

infrastructure development, labour reforms, smooth credit, an improved intellectual property rights regime, and reduced red-tapeism, when addressed, can ensure greater success of the PMA.

For financial year 2021, the proportion of infrastructure investments to the gross domestic product (GDP) was estimated to be nearly four percent whereas for China it was 15.92 percent. For comparison, the world average in 2021 based on 154 countries is 16.83 percent. So India needs to spend more on telecom infrastructure development.

India, being strong in software & information technologies, can use machine learning, artificial intelligence and other forms of reality technologies to further increase production and process efficiencies to make ourselves competitive. Today India can match and even better the products that are being manufactured in China, both in terms of cost and quality, which is bound to bring in tremendous business to India. There is also a lot of space to grow and improve, in areas of core manufacturing process, material understanding, designing, employment training, machine manufacturing, data tracking and even in automation. All of these opportunities have the potential to make the Indian manufacturing sector a global hub for all kinds of manufacturing.

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CHAPTER 6: TELECOM INDUSTRY IN CHINA AND USA

6.1 CHINA

China, with 1.4 billion population, has the world's largest fixed-line and mobile network in terms of both network capacity and number of subscribers with 5G connections exceeding 1 Billion mark. China's accession to the World Trade Organization (WTO) in 2001 resulted in the gradual opening of the Chinese telecom services market to foreign companies.

i. Foreign Participation

Foreign equipment vendors were allowed to invest in China after its accession in WTO in 2001. Authorization for the investments was conditioned on technology transfer. International telecom carriers (service provider) were banned from accessing the market. As part of the WTO commitments, the Chinese government opened gradually the carriers market to foreign investors. In 2005 foreign investors were authorized to form joint ventures, investing up to 50% in Internet services in the whole country, up to 49% in the mobile sector in 17 major Chinese cities and up to 25% in fixed-line basic services in Beijing, Shanghai and Canton (Guangzhou).Finding a Chinese partner to form a joint venture with, preferably a major carrier is mandatory for a foreign company wishing to access the Chinese market.

Foreign investments came, in order of importance, from the United States, Canada, Sweden, Finland, Germany, France, Japan and South Korea.

The Information Technology Agreement (ITA) in WTO has tremendously benefitted China's economy, ICT industries and enterprises.

ii. Market overview

The telecommunications industry has undergone significant changes in recent years, driven by rapid technological advancements and changing consumer behaviour. Here is a brief market overview of the telecommunications industry:

Market size: The global telecommunications market is valued at around $2.5 trillion as of 2021, and it is projected to continue growing in the coming years. The market is highly competitive, with many players competing for market share.

Emerging technologies: Emerging technologies such as 5G, artificial intelligence, and the Internet of Things (IoT) are transforming the telecommunications industry. These technologies are expected to bring significant changes in the way people communicate and access information.

Competition: The telecommunications industry is highly competitive, with many players competing for market share. The market is dominated by large players such as AT&T, Verizon, China Mobile, Vodafone, and Deutsche Telekom.

Revenue streams: The primary revenue streams in the telecommunications industry include mobile services, fixed-line services, and broadband services. The industry is also exploring new revenue streams such as cloud services, IoT, and digital advertising.

Regulatory environment: The telecommunications industry is subject to extensive regulation by governments around the world. Governments regulate aspects such as pricing, spectrum allocation, and data privacy.

iii. Network equipment suppliers in China

China is home to several network equipment suppliers, including some of the world's largest companies in the sector. Some of the major network equipment suppliers in China are:

Huawei Technologies Co., Ltd. - Huawei is one of the largest network equipment suppliers in the world, with a wide range of products including routers, switches, and optical transmission systems.

ZTE Corporation - ZTE is another major network equipment supplier in China, with a focus on 5G technology and other advanced telecommunications equipment.

FiberHome Technologies Group - FiberHome is a leading supplier of optical fiber and network equipment in China, with products including optical transmission systems, optical fiber cables, and routers.

Datang Telecom Group - Datang is a state-owned enterprise in China that specializes in telecommunications equipment, including network infrastructure and mobile devices.

China Telecom - China Telecom is a major telecommunications company in China that also provides network equipment and services, including routers, switches, and other infrastructure.

These are just a few of the many network equipment suppliers in China, which is a significant player in the global telecommunications industry.

iv. ITA Expansion and Innovation in ICT Services Sectors

Overall, the Information Technology Agreement (ITA) in the WTO has had a positive impact on the ICT industry throughout the world , promoting trade in IT products and reducing the digital divide between developed and developing countries. The agreement has also helped to drive innovation and growth in the industry, and it has benefited companies and consumers around the world.

Over the past several years, China has invested considerable resources in trying to develop an indigenous Chinese semiconductor industry. For example, in December 2013, China allocated $5 billion to establish a Regional Semiconductor Investment Fund for

1. Semiconductor design, manufacturing, assembly, testing, and core equipment with the aim of creating a complete, interactive, and high-end industry chain.

2. Engineering research centres, engineering labs, corporate research and development centres to improve indigenous innovation capabilities and Industry consolidation, mergers, and acquisitions. Aim was the creation of three to five regionally based “semiconductor development companies” with state backing for the initiative expected to reach $16.5 billion.

v. China telecom sector: factors for Growth of Telecom manufacturing

a. Government to be the prime enabler for creating startup ecosystem – creation of funding avenues in the form of seed funds ,incubators , fund for innovation , provision of access to market through Policy interventions and preference for startup products in Govt procurement.

b. Government to draw policy road map for facilitation of eco system for start up: Mass Entrepreneurship and innovation Scheme Initiative launched in 2019 prescribes 89 measures for Key issues affecting startups and employment including 78 preferential tax measures like 70 % reduction on taxable income for Venture Capital firms/investors, Redefining threshold for SMEs, Corporate Tax reduction and VAT exemptions for Startup and SMEs.

c. Identification of key futuristic technology areas for indigenous innovation and Products: Setting up Labs to Fab clusters –setting universities that support research on the identified technologies, Startup and SMEs within each cluster with Provision of Funds an infrastructure .Focus on niche sector for innovations with the objective of being the world leader in Chosen technologies: Recently China has identified AI and Blockchain as technologies to dominate and encouraged Startups in these areas.

d. Focused Vision: Make in China for Manufacturing was started in 2015 and now make in China 2025 vision is for Innovation in IoT, BlockChain, AI etc.

China has funded more than 100 government research institutions with over 600,000 technicians and specialists engaged in various types of R&D related to the production of telecommunications equipment and other high-technology goods through 'Made in China 2025' (MIC 2025) in 2015 which seeks to boost China's economic competitiveness by advancing China's position in the global manufacturing value chain including core component manufacturing, leapfrogging into emerging technologies, and reducing reliance on foreign firms. The domestic content requirement for mobile and other electronic devices are as high as 80 % .

Venture Capital (VC) industry in China has grown rapidly, and increasingly focused on the digital sector. The IT sector saw 837 venture capital investment whereas the semiconductor and electronics sector saw 419 venture capital investment in the year 2020.

Sinosure China Export & Credit Insurance Corporation was established in 2001, in particular coverage for the export of high-value added goods in China. Sinosure offers coverage against political risks, commercial and credit risks. This includes short-, medium- and long-term export credit insurance, investment insurance, bond and guarantee business, debt and capital retrieval business and credit assessment business. Investment guarantees cover political risks such as currency and remittance restrictions, expropriation and nationalization, sovereign breaches of contract and war.

Over the past three decades, R&D investment in China has risen by nearly a factor of 40 due to the strategic planning devised by China for promotion of R&D. The country has designated a number of National Economic and Technological Development Zones (NETD Zones, or ETDZs) and Special Economic Zones (SEZs), each of which offers its own mix of incentives and its own rules and regulations which must be met in order to receive them. It has recently developed policies supporting SMEs and manufacturing research and development (R&D) which incorporate huge deductions in taxes for various components in the manufacturing value chain aimed at removing the adverse impact of Covid-19 on the country.

Chinese Govt embraces the need for “Mass Entrepreneurship”, multiple of Policies to promote Startups including direct funding and investments, tax incentives, improvise legal systems, support universities in aiding skill development etc, there are 360 such Funds raising targets of $ 65 Bn.

Chinese Technology majors such as Tencent and Alibaba have been nurturing ecosystems for Startup. IT and internet startup ecosystem is flourished around Beijing, eCommerce and Fintech startup ecosystems around Shanghai and Manufacturing /Hardware industry ecosystems around Shenzen.

In 2012, Huawei Technologies overtook Sweden's Ericsson to become the world's largest telecom equipment vendor As of 2021, there are over 989 million internet users and around 1.62 billion mobile phone subscriptions in China, and the telecom sector's monthly revenue was over 100 billion yuan ($15.52 billion).

In 2021, mobile technologies and services generated 5.6% of GDP in the region, a contribution that amounted to nearly $900 billion of economic value added.

6.2 Telecom Sector of USA

The USA telecom regulator, Federal Communications Commission (FCC), finalized a $1.9 billion program to replace equipment from Chinese telecom companies in 2021 because The US govt initiated for 100% local content in telecom products amidst the risk of data security breaches through financing at the early stages of expansion of industries debt (borrowings) from banks, venture capitalists and government.

Some of the existing schemes for domestic manufacturing promotion in USA are –

1. Manufacturing Extension Partnership (MEP): It is a system of government and non-profit partnerships coordinated by National Institute of Standards and Technology and it is intended to help small and medium-sized manufacturers improve production processes, upgrade their technological capabilities, and innovate.

2. Manufacturing USA (MUSA) : It is a network of 14 research institutes to make early-stage scientific research suitable for use in manufacturing production. The research institutes are public-private consortia, located near universities or national laboratories and are an active example of promoting industry academia linkage by the government.

3. AMTech : it is a competitive grants program through new organizations or strengthening existing industry-driven associations to address high-priority research challenges impeding the growth of advanced manufacturing in the United States. It incentivizes the formation and strengthening of industry-driven technology associations in areas of advanced manufacturing technologies and associated long-term industrial research challenges.

4. National Export Initiative (NEI): it is a customer service-driven strategy with improved information resources to ensure American businesses are fully able to capitalize on expanded opportunities to sell their goods and services abroad. It supports American Export companies by providing information on specific export opportunities, working more closely with financing organizations and service providers, and partnering with states and communities to empower local export efforts.

5. The Investing in Manufacturing Communities Partnership (IMCP):It is program through which the federal government is rewarding best practices – coordinating federal aid to support communities' strong and similar development plans and synchronizing grant programs across multiple departments and agencies. It encourages communities to develop comprehensive economic development strategies that will strengthen their competitive edge for attracting global manufacturer and supply chain investments. Also Non-designated communities nationwide can learn from the best practices employed by these designated communities to strengthen American manufacturing.

6.3 Equipment Authorization

Radio Frequency (RF) devices are required to be properly authorized prior to being marketed or imported into the United States. The Office of Engineering and Technology (OET) administers the equipment authorization program under the authority delegated to it by the Commission. This program is one of the principal ways the Commission ensures that RF devices used in the United States operate effectively without causing harmful interference and otherwise comply with the Commission's rules. All RF devices subject to equipment authorization must comply with the Commission's technical requirements prior to importation or marketing.

Equipment that contains an RF device must be authorized in accordance with the appropriate procedures , These requirements not only minimize the potential for harmful interference, but also ensure that the equipment complies with the rules that address other policy objectives – such as human RF exposure limits and hearing aid compatibility (HAC) with wireless handsets.

The Commission has two different approval procedures for equipment authorization – Certification and Supplier's Declaration of Conformity (SDoC). The required procedure depends on the type of equipment being authorized as specified in the applicable rule part. In some instances, a device may have different functions resulting in the device being subject to more than one type of approval procedure.

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CHAPTER 7: CONCLUSION AND RECOMMENDATION

7.1 Conclusions

i. A robust telecom network needs a strong telecom manufacturing base which, in turn, will contribute significantly to the GDP and employment in the country.

ii. The government has been laying emphasis on the semiconductor industry in last few years. The country could achieve a degree of self-sufficiency in domestic manufacturing in telecom sector in next 2-3 years, manufacturing of semiconductors in India is being scaled up. A large deposit of rare earth metal Lithium has been discovered in Jammu and Kashmir.

iii. The task of creating and nurturing Telecom Product industry, with design development and IPR generation, is taking place within India. TSDSI and TEC are achieving success in standardization in new technologies. However, International standard Test labs needed within country for high end equipment. Several measures need to be taken to increase domestic production and enhance the value addition to the products being manufactured in the country.

iv. Indian Products suffer from disadvantage due to poorer infrastructure, poor and higher cost power supply, higher interest rates, longer custom clearance times.

7.2 Recommendations

India has tremendous entrepreneurial energy which must be harnessed for the success of Make in India in telecommunication. There is a need to encourage bright young entrepreneurs and equip them with requisite credit (pre-venture and venture capital), management and mentoring support. Entrepreneurship Model is particularly suitable to set up new Telecom Product companies. Also creating a

market pull would encourage venture capital to invest in such start-ups. Further, the following initiatives need to be taken:

a) Leverage large domestic market to provide more preferential market access to Indian Products.

b) A potent policy support to stimulate domestic product manufacturing without adverse financial impact to the government.

- 100% Preference for Indian products in government procurement and projects funded by government / USO.
- Obligation for Telecom operators to buy Indian Products (IP) and Indian manufactured Products (IMP).
- More Incentives for telecom operators to buy Indian Products and progressively increase indigenous content in network. Like decrease in License fee etc.

c) Enabling environment needs to be created for operators to commit to support Indian Products .

- Commitment to purchase Indian products when they are comparable in price and performance to imported products.
- Commitment to participate in trials of newly created Indian products, nurture them and place pilot orders.
- Funding R&D and support Indian IPR creation and driving in standards for International Level Labs.

The recommendations to catalyse domestic manufacturing are as under:

a) Deemed export status to sales of Indian Products in India (since import duty of the corresponding product is anyway zero).

b) To make Indian Product companies competitive, they should be given a subsidy of 10% of their sales (domestic and export) for the next 5 years.

- Incentivise to set up system assembly, components, piece-parts and entire manufacturing ecosystem within the cluster of Investment and Manufacturing Zones (NIMZs

c) Develop strong Supply chain within the country and increase contribution in Global value chain (GVC) for subsystem & IC.

d) Support companies with good track record to become strong global players through Telecom Promotion Fund of Rs 10,000 Crores for soft loans (at interest rates of 3-5%) to manufacturers of Indian products for domestic as well as exports and for operators who deploy these products.

e) Income tax exemption for Indian Product companies for a period of 5 years (on the lines for software exports).

- Strengthening ITI, C-DoT, C-DAC, SCL (semiconductor Complex Ltd) Mohali for working with coordination of Private Telecom Manufacturer /Service Providers .

- Strengthening of C-DOT centre by infusion of fund through govt, Partnership with global MNC for Technology Transfer, Semiconductor design & development through limited) C-DAC or privates companies & strong supply chain for domestic & international manufacturer .

- Insurance to exporters / suppliers against credit and political risks in international trade.

- Graded incentives beyond PMI/PMA Policy for Deploying more indigenous equipment. Specialized procurement programmes open only for MSMEs and Start-up product, Breaking of larger projects into small procurement programs to enable start up participation. PMA should be

made attractive by elimination of pre-requisite such as past experience, past order etc.

- Government should create Telecom Innovation Authority with focussed agenda for next decade after identifying 5-10 technologies to increase Patent portfolio of India like Block chain, IOT, AI, 5G and 6G technologies.

- Utilization of TDRF Telecom Development research Fund and USOF

The concern of telecom operators for AGR and SUC (Spectrum Usage Charges) must be addressed to. Fund of TTDF and USOF should be properly and wholly utilized.

More emphasis on Silicon Semiconductor Chip fabrication project and self-reliability for rare metal Lithium as it helps in further growth of Electronics industry .

- Creation of Telecom Entrepreneurship Development Board and Telecom Finance Corporation (TFC) at national Level.

- Combination of venture funding and low-interest loans through NBFC or Telecom Finance Corporation.

- Active support and funding to promote Indian Telecom Product brands in international trade shows and target markets. Contribution enhancement in Global value chain (GVC) in order to increase export.

- To give market access in telecom licensee (public as well as private) will result in assured market to Indian equipment manufacturers for achieving economies of scales and also units set up by multinational companies in India.

- With more and more innovative services and network technologies appearing on the horizon, It is recommended that C-DOT be strengthened by DoT to pursue major technology schemes for domestic manufacturing.

India must significantly scale up its influence on telecom technology growth urgently.

TSDSI for developing standards for access, back-haul, and infrastructure systems, solutions and services that best meet India specific Telecom/ICT needs, based on research and innovation in India. Copyright and IPR rights should be further updated and stringently protected Framework for use Case Lab, Interoperability Test and New Technology Trials to be set up and driven as part of pre & post standardization activities

To strengthening TEC for drawing up of standards, generic requirements, interface requirements, service requirements and specifications for telecom products, services and networks. International standard Labs and Certification facility is desired to ensure security of Latest Telecom gears and software products.

Tax Deferral/ tax holidays incentives can be utilized for Export of Indian telecom goods/services.

Venture capital in form of equity and soft loans, project finance, contract finance, credit default insurance.

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Annexure A: RESPONSES to SURVEY ON MAKE IN INDIA IN THE FIELD OF TELECOMMUNICATION

Chart 1: Domestic manufacturing activities in telecom sector

Domestic manufacturing activities in Telecom sector can be increased by providing Tax , Incentives, R&D promotion and FDI in Telecom Sector. Do you agree?

61 responses

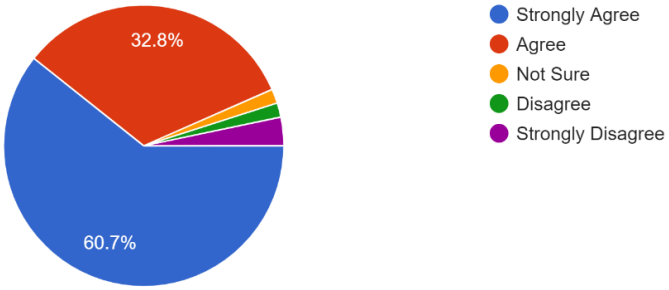


Chart 2: Safety and security of critical data

Domestic manufacturing will ensure safety and Security of critical data of Telecom network of Service Provider. Do you agree?

61 responses

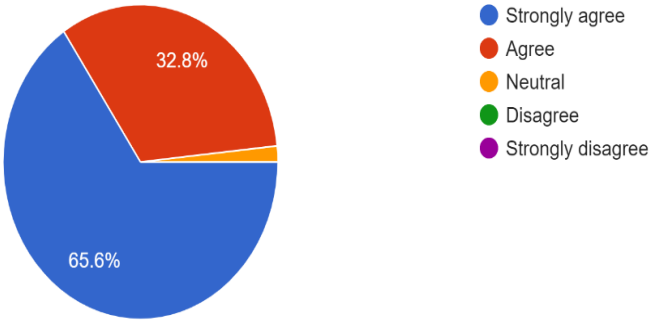


Chart 3: Large scale domestic manufacturing hindered

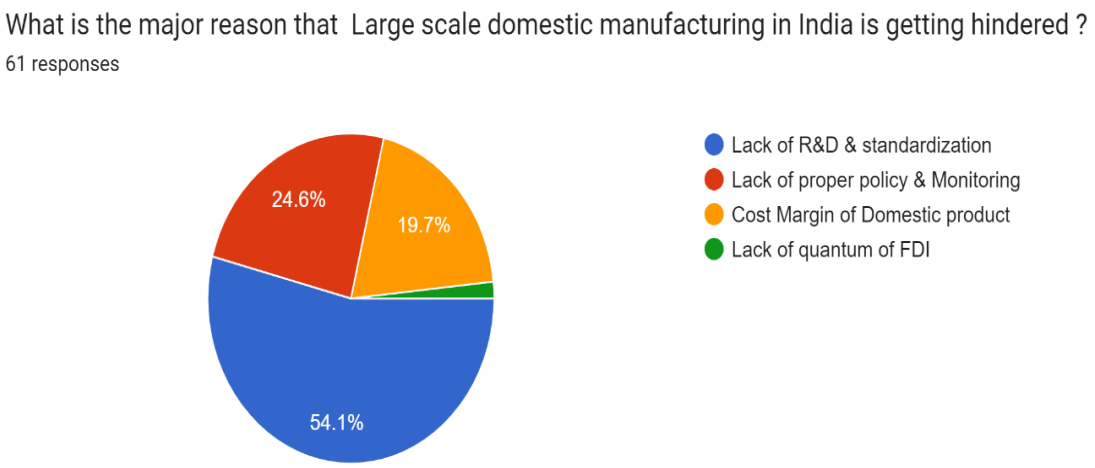


Chart 4: Increase in telecom export

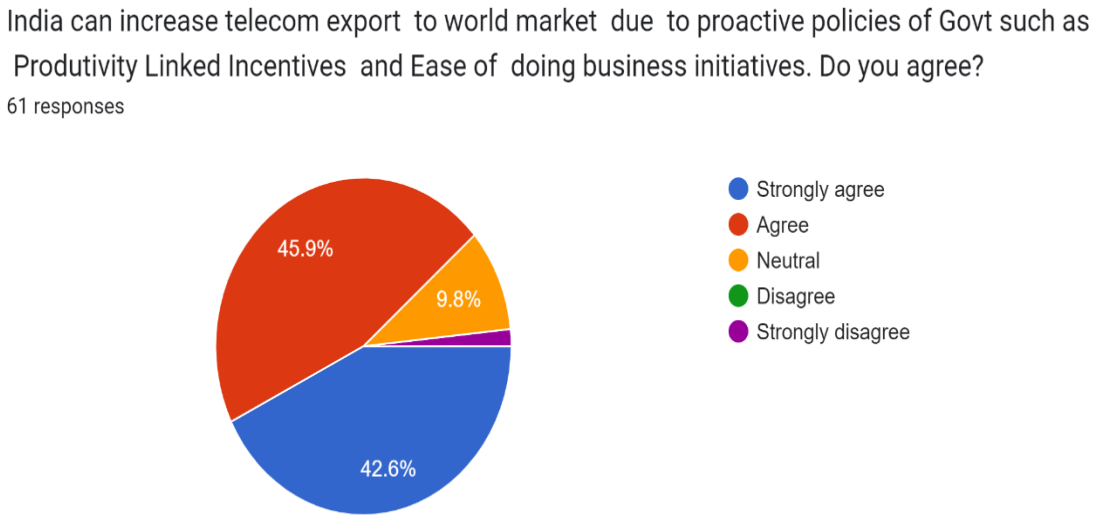


Chart 5: Transfer of technology and creation of IPR in India

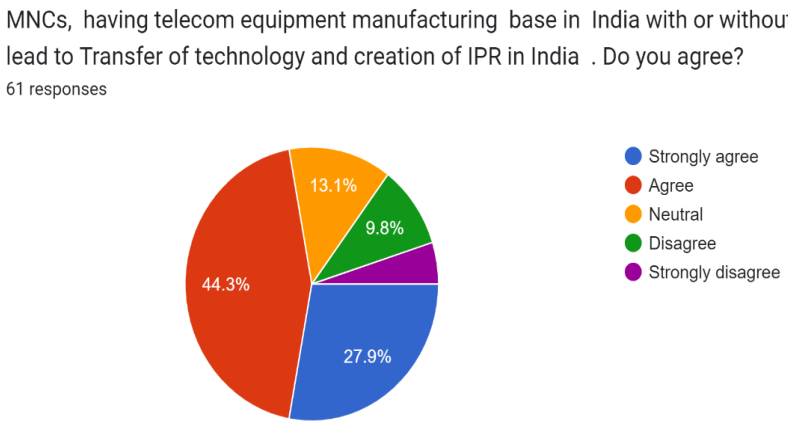


Chart 6: Schemes

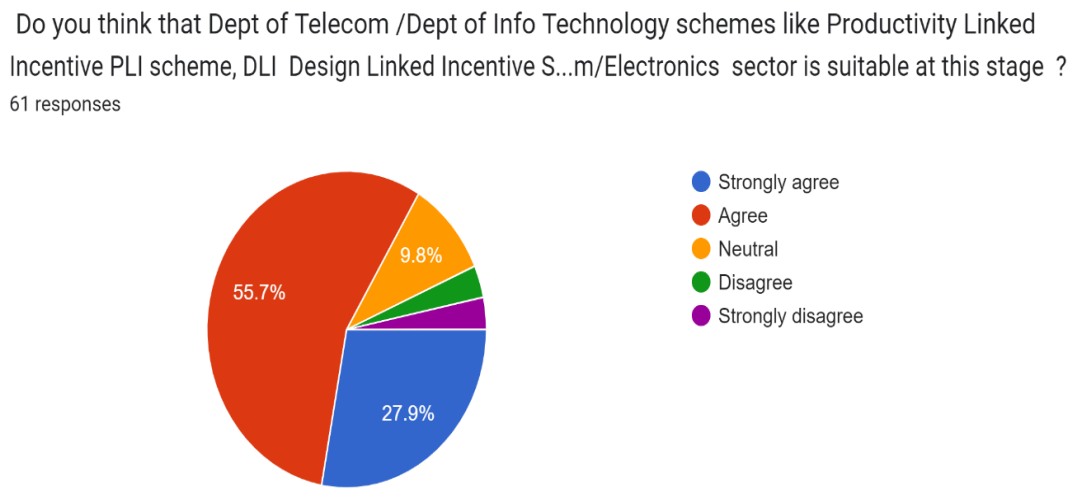


Chart 7: Reason of telecom equipment import

What is the major reason of telecom equipment import ?

61 responses

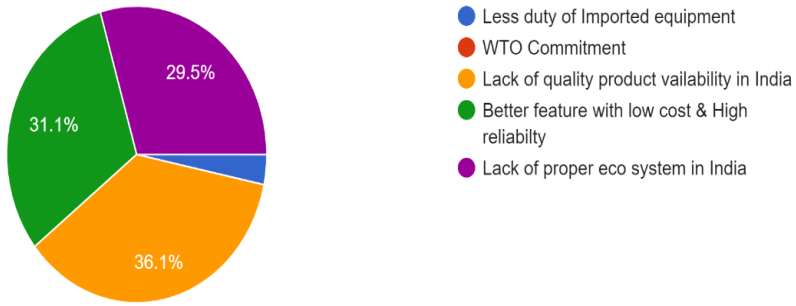


Chart 8: Policy measures required to boost innovation and productivity

What policy measures are required to be instituted to boost innovation and productivity of Local manufacturing in our country ?

61 responses

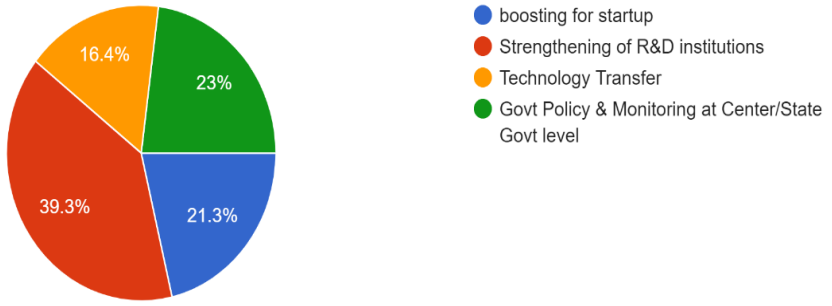


Chart 9: Govt. efforts

Do you agree that Govt efforts like PLI scheme shall be able to promote indigenous R & D and Telecom equipment manufacturing of world class q...and it should be further extended beyond 2025 ?

61 responses

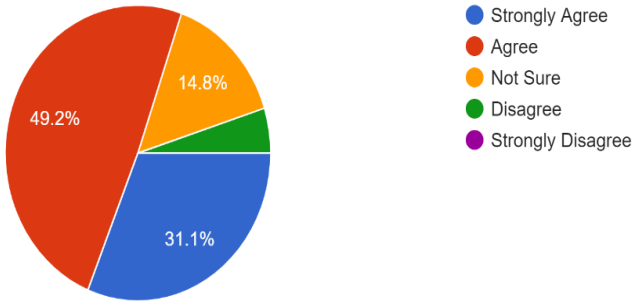


Chart 10: Fiscal and financial incentives to be promoted

Do you feel that more Fiscal and financial incentives are needed to promote make in India in Telecom sector as per need basis ?

61 responses

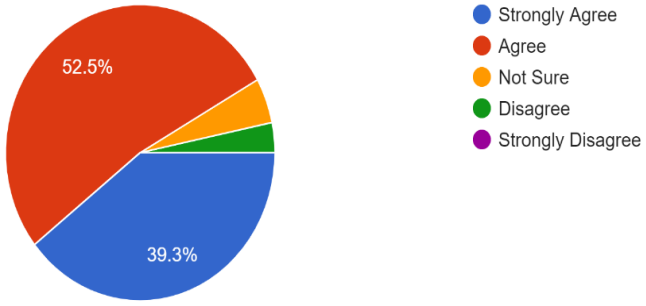


Chart 11: Digital Comm Innovation Scheme

A lot of Startup companies are being boosted through Champion Service Sector Scheme under DCIS Digital Comm Innovation Scheme.Through eas... will produce desired result of R&D development?

61 responses

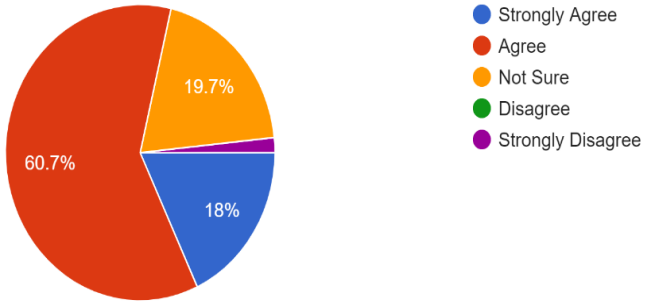


Chart 12: Standardization of telecom products/services

Are you satisfied with Standardization of Telecom products /services being set up by TEC and standardization of IPR policy , Software Copyright P...nti-Trust policy of TSDSI under Dept of Telecom ?

61 responses

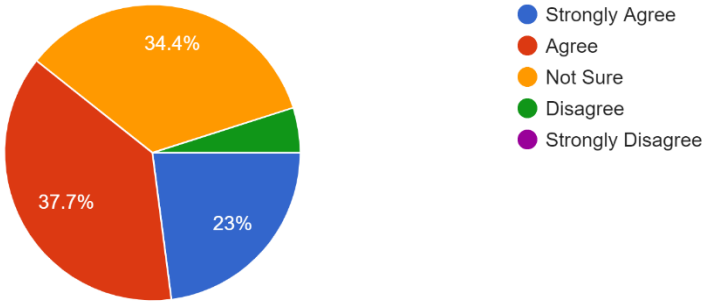


Chart 13: Telecom products under Make in India

For deployment of Telecom products under Make in India in Domestic service sector , sufficient Financial incentives/Loan schemes from Central /St...rs . Do you agree that these steps are effective ?

61 responses

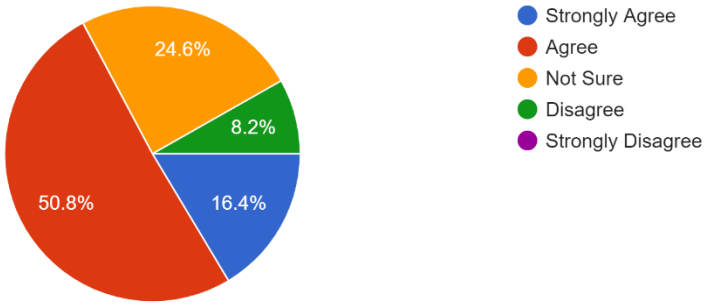


Chart 14: 5G technology roll out activities

A lot of positive developments regarding Make in India in Telecom sector has taken place , particularly in 5G technology roll out activities . ...or has improved considerably during last few years ?
61 responses

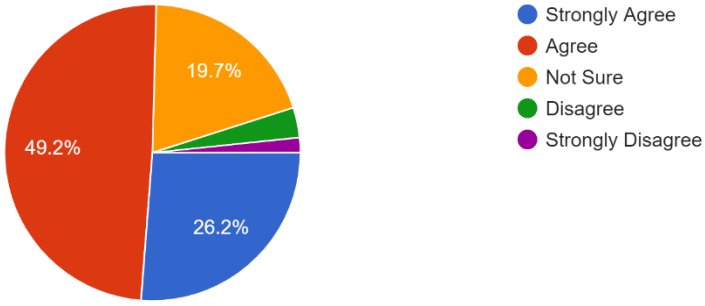


Chart 15: PMA/PMI

Govt of India has adopted PMA/PMI Preferential Market Access/Procurement under Make in India where stress is on purchase of Telecom products wi...ot affecting quality of Telecom Goods/services ?
61 responses

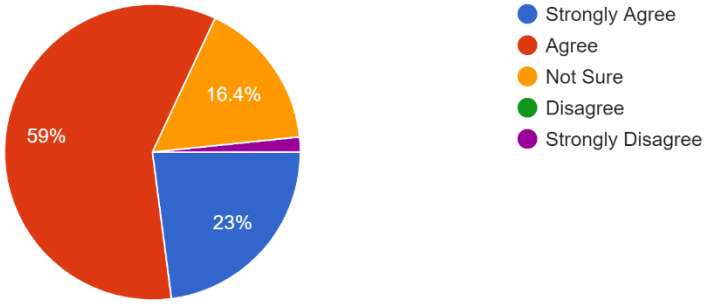


Chart 16: Silicon chip manufacturing facility in Gujarat

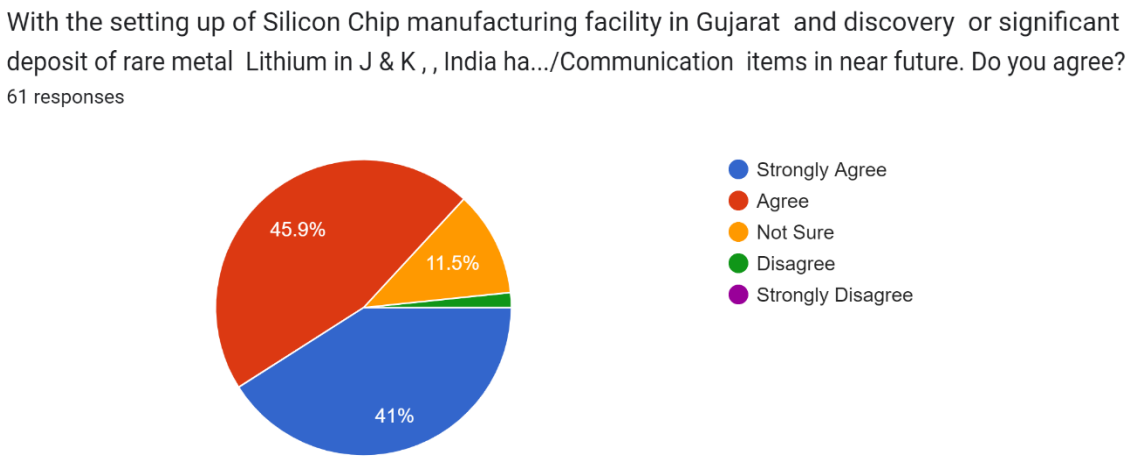
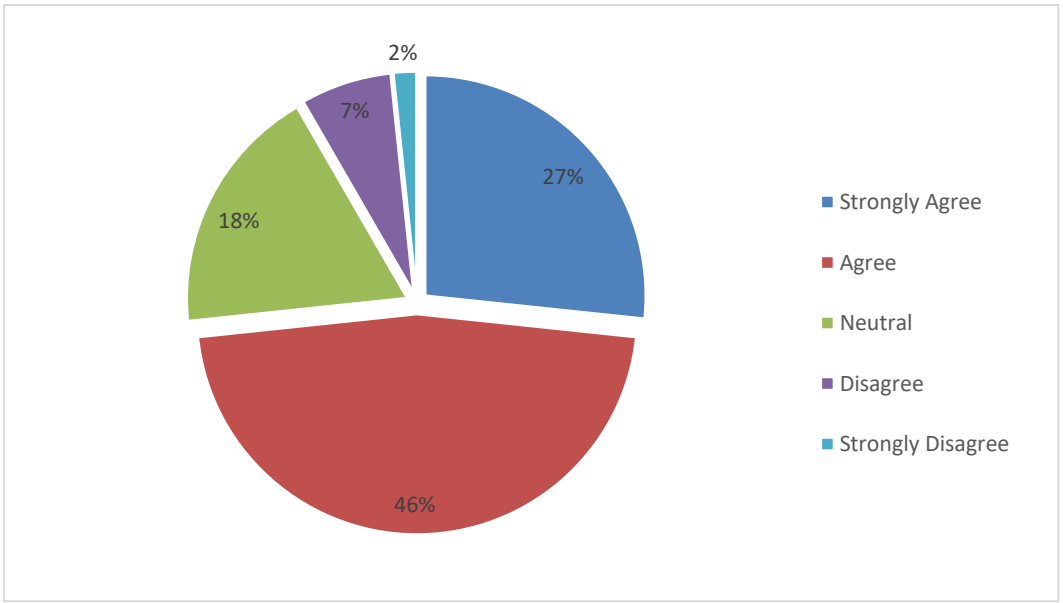


Chart 17: C-DAC, C-DOT, ITI Ltd and TCIL contribution

Do you agree that C-DAC , C-DOT , ITI Ltd and TCIL have done tremendous contribution in manufacturing and deployment of domestically manufactured products in BSNL and other private Service providers by developing indigenous 4G solutions , 5G Core network and in implementing lucrative projects in IT, Telecom, Defense, Railway and State govt.?



Annexure B- Survey Questionnaire

1.Domestic manufacturing activities in Telecom sector can be increased by providing Tax , Incentives, R&D promotion and FDI in Telecom Sector. Do you agree?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

2.Domestic manufacturing will ensure safety and Security of critical data of Telecom network of Service Provider. Do you agree?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

3. What is the major reason that Large scale domestic manufacturing in India is getting hindered ?

a. Lack of R&D & standardization

b. Lack of proper policy & Monitoring

c. Cost Margin of Domestic product

d. Lack of quantum of FDI

4.India can increase telecom export to world market due to proactive policies of Govt such as Produtivity Linked Incentives and Ease of doing business initiatives. Do you agree?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

5.MNCs, having telecom equipment manufacturing base in India with or without joint venture , will lead to Transfer of technology and creation of IPR in India . Do you agree?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

6.Do you think that Dept of Telecom /Dept of Info Technology schemes like Productivity Linked Incentive PLI scheme, DLI Design Linked Incentive Scheme and other Incentives to MNC and Domestic companies in Telecom/Electronics sector is suitable at this stage ?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

7. What is the major reason of telecom equipment import ?

a. Less duty of Imported equipment

b. WTO Commitment

c. Lack of quality product availability in India

d. Better feature with low cost & High reliability

e. Lack of proper eco system in India

8. What policy measures are required to be instituted to boost innovation and productivity of Local manufacturing in our country ?

a. boosting for startup

b. Strengthening of R&D institutions

c. Technology Transfer

d. Govt Policy & Monitoring at Center/State Govt level

9.Do you agree that Govt efforts like PLI scheme shall be able to promote indigenous R & D and Telecom equipment manufacturing of world class quality and robust nature and it should be further extended beyond 2025 ?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

10.Do you feel that more Fiscal and financial incentives are needed to promote make in India in Telecom sector as per need basis ?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

11. A lot of Startup companies are being boosted through Champion Service Sector Scheme under DCIS Digital Comm Innovation Scheme. Through ease of doing Business and reducing regulations and simplification of procedures the eco-system for Manufacturing of telecom Products in India has improved. Do you agree that the steps will produce desired result of R&D development?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

12. Are you satisfied with Standardization of Telecom products /services being set up by TEC and standardization of IPR policy , Software Copyright Policy and Anti-Trust policy of TSDSI under Dept of Telecom ?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

13.For deployment of Telecom products under Make in India in Domestic service sector , sufficient Financial incentives/Loan schemes from Central /State Govt to Service Providers have been provided to Service Providers/ Domestic manufacturers . Do you agree that these steps are effective ?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

14. A lot of positive developments regarding Make in India in Telecom sector has taken place , particularly in 5G technology roll out activities . Do you believe that eco-system for domestic manufacturing of Telecom sector has improved considerably during last few years ?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

15. Govt of India has adopted PMA/PMI Preferential Market Access/Procurement under Make in India where stress is on purchase of Telecom products with make in India content or value addition and local manufacturers are being given preferential treatment . Do you agree with these steps will be effective and will not affecting quality of Telecom Goods/services .?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

16. With the setting up of Silicon Chip manufacturing facility in Gujarat and discovery or significant deposit of rare metal Lithium in J & K , , India has a good chance of becoming Manufacturing hub of Electronics/Communication items in near future. Do you agree?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

17. Do you agree that C-DAC , C-DOT , ITI Ltd and TCIL have done tremendous contribution in manufacturing and deployment of domestically manufactured products in BSNL and other private Service providers by developing indigenous 4G solutions , 5G Core network and in implementing lucrative projects in IT,Telecom ,Defense ,Railway and State govt ?

i) Strongly Agree ii) Agree iii) Not Sure iv) Disagree v) Strongly Disagree

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