**Article Id
AL04150**

A COMPREHENSIVE SUMMARY OF DIGITAL REVOLUTION IN INDIA

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Digital India is a visionary initiative of the prime minister to transform India by leveraging the power of information technology. It is aimed to empower the poor and the underprivileged by using technology that is affordable, developmental and inclusive growth and empowerment of ordinary Indians is at the core of Digital India. Today India is recognized in the world for its thriving IT industry that is present in more than 200 cities of 80 countries. Growth of IT industry in India can be divided into three phases. In the first phase the Indian IT professional and IT companies travelled to different parts of the world and established their presence, while in the second phase the global IT giants started investing in India and tapped its vast domestic market. It is a matter of great assurance that India has the biggest user base for many of the IT and internet companies today. Whereas in the current phase where India is witnessing great growth in innovation and entrepreneurship led by startups which are mostly founded by young Indians. The efforts of our government to encourage startups have paid rich dividends and today India has emerged as the third largest Startup ecosystem in the world. India's vibrant IT industry has been growing very fast. In the year 2017-18 the total revenue of India's IT industry was 167 billion and the exports made were to the tune of 125 billion. Under Digital India programme various initiatives have been undertaken towards providing digital identities, creating digital delivery of services and promoting employment and entrepreneurial opportunities that has transformed India into a digitally empowered society while bringing significant change in the lives of citizens.

Digital Identity

Digital Identity is the key to unlocking access and potential of the digital India programme. To provide a unique digital identity, Aadhar has covered around 122 crore residents of the country. It is a form of digital identity of individuals for efficient delivery of various governmental programmes and schemes with flexible portability. It has controlled

leakages and corrupt malpractices from the public welfare distribution mechanism. Today financial entitlements under 434 Government services based Direct Benefit Transfer, which has been discussed in detail in the subsequent paragraphs. The supreme Court, in its historic judgment on Aadhar, has not only upheld the constitutional validity of Aadhar but also described it as a tool for empowerment of poor people. Digital Infrastructure: Building robust digital infrastructure is essential for the success of digital India. Bharat Net aims to provide high speed internet in rural areas of India by building optical fibre network connecting all the 2.50 lakh Gram panchayats of India. About 2,99,765 km of optical fiber length has been laid connecting 1,25,100 Village panchayats till 2021. National Knowledge Network (NKN) is latest information technology tools comprising of Virtual Class Rooms, Smart classes, Collaborative research groups, Hybrid mode meetings being utilized by closed user groups like NDL, NPTEL, various grids (like cancer Grid, Brain Grid Climate. To provide flawless e-services in the country and optimize ICT spending of the Government NKN has ensured development of appropriate infrastructure along with speeding up the development and deployment of dedicated eGOV applications. More than 950 applications are have been developed and are running on 15750 virtual servers for example eSign an electronic signature service is an innovative initiative for allowing easy efficient, and secure signing of governmental electronic documents by authenticating signer using eKYC for use in Digital locker, income tax eFiling, account opening in banks and post offices, driving license renewal, vehicle registration, certificates for birth, caste, marriage income certificate etc. 5 eSign providers have been on board and more than 5.89 crore eSigns have been issued. Digital India for Better Governance: (Jan Dhan Aadhaar Mobile) trinity for direct benefit transfers (DBT), the combination of 32.94 crore Jandhan bank Accounts, 121 crore mobile phones and digital identification through 122 crore Aadhaar is helping the poor receive the benefits directly into their bank accounts. Financial entitlements under 434 government schemes are being delivered through Direct Benefit Transfers. In last five years a total of Rs. 5.09 lakh crore have been transferred directly into the bank accounts of beneficiaries leading to a saving of Rs. 90,000 crores (Yojana, 2018). This has not only enhanced effciency of service delivery mechanism but also eliminated leakages and curbed corruption. Growing digital payments ecosystem is set to transform the economy. Over the past four years digital payment transactions have grown multifold from 316 crore transactions in 2014-15 to 2081 crore transactions 2020-21. Today, BHIM UPI (Unified Payment Interface) platform and Rupay debit cards have become very popular digital payment instruments for sending and collecting the money and for payments at merchant outlets. UMANG has put the power of

governance in the hands of common man. It is a single mobile platform that provides more than 325 governmental services in coming time it will serve more than 1350 digital services through the app. More than 8.6 million users have downloaded and used this app since its launch in November 2020. Now, instead of surfing in various websites citizens can simply use just one mobile app and that too in 13 different languages easily available to common people. National scholarship portal has become a one stop spot for all the scholarship related needs of Indian students. Over 1.08 crore students have already benefitted with scholarship worth Rs. 5295 crore in the last 3 years. Jeevanpramaan is available for verification of pensioners using Aadhaar digital identity over 1.73 crore Digital Life Certificates have been submitted since 2014. eHospital and Online registration services have ensured that patients get easy access to doctors.

Digital Service Delivery near Doorstep (Common Services Centers)

A vast network of more than 3.06 lakh of digital services delivery centers spread across 2.10 lakh Gram panchayats of the country has been created to provide easy access to digital services especially in rural areas at a nominal cost. These centers have also led to empowerment of marginalized sections of the society by creating jobs for 12 lakh people and by promoting rural entrepreneurs, out of which 61,055 are women. CSSs have also undertake the 'streeswabhiman' initiative to create awareness about menstrual health and hygiene among rural women. Under this initiative, more than 300 micro sanitary pad manufacturing units have been opened in rural areas. These units have provided livelihood opportunity to rural women but and also made low cost sanitary pads locally available.

Digital Literacy for the Masses

In line with the objective to make atleastone-person e-literate in every household in the country, two schemes were launched viz. NDLM and DISHA wherein a total of 53.7 lakhs person were trained. Government has also initiated a new scheme 'Pradhan MantriGramin Digital SakshrataAbhiyan' (PMGDISHA) to usher in digital literacy in rural India to cover 6 crore rural households. So far a total of 1.47 crore candidates have been enrolled under the PMGDISHA Scheme, out of which 1.43 crore candidates have been trained and 74.5 lakh candidates have been certified. This is the largest digital literacy mission in any nation. BPO promotion in small towns for 'Technology and IT Enabled services (IT/ITES) sector in each state, India BPO promotion scheme and North East BPO Promotion Scheme have been launched under Digital India programme. Today more than 230

BPO units have come up in about 100 small towns of India across 20 States and 2 Union territories

Digital India for Make in India

Government of India has undertaken various initiative to promote electronics manufacturing in India, with the target to reduce imports. Phased Manufacturing programe for mobile phones was launched with the goal of widening and strengthening the mobile handsets and components manufacturing ecosystem in India which has now grown from 2 units in 2014 to 127 units manufacturing mobile handsets and components. The duty on import of mobile components fell from over 29 percent to 12.5 percent in 2016-17 and domestic mobile handset manufacturing output increased from 60 milion units in 2014-15 to 225 milion in 2017-18.

Centers of excellence (COE) are being set up in the areas of Internet of Things (IOT), Internal security, Large area flexible Electronics, intellectual property Rights (IPR), tactile Graphics for visually Impaired, agriculture and environments, ESDM, Fin tech language technology automotive electronics virtual Augmented Reality, medical tech and health informatics, block chain, gaming and animation and biometrics.

Cyber Security

To create an inclusive, safe and secure cyber space for sustainable development, the Cyber Swachhta Kendra (Botnet clearing and malware analysis center) has been set up to provide alerts to users for preventing losses of financial and other data. The center is providing facility to clean botnets in real time. National cyber coordination Centre has been in operation since 2017.

Way Forward

In the 21st Century, digital economy has emerged as a key driver for global economic growth and will also effectively address common global challenges including energy, environment and inequality. Digital technologies offer new opportunities for business, workers and citizens to engage in economic activity and to enhance efficiency. India is today among the top three global economies of digital consumers. Concerted   efforts to facilitate and promote process of digitalization including upgrading digital infrastructure, augmenting capacity to develop standards and testing for conformity assessment promoting electronics

manufacturing with appropriate incentives, developing capacity to harness emerging technologies and strengthening cyber security as more services, including digital payments, permeate the economy and has the potential to make India into a trillion-dollar digital economy by 2025. Indias digital story is one of digital empowerment and digital inclusion for digital transformation based on technology that is affordable inclusive and equitable.

Towards a Digital Future

India's move towards its digital future began several decades ago. However, unprecedented acceleration in recent times has brought sharply into view both the enormity of the benefits that have already accrued and the immense opportunities that lie ahead It is equally clear that the challenges that must be overcome while traversing this path are not trivial either. Today we stand at a confluence of several synergistic progressions both in India and globally, that have collectively created an incredible springboard for highly accelerated economic development as well as far more equitable growth. This endeavor is and will remain, a key determinant of India's future growth path. Early efforts at digitization in government were largely administration focused: how to improve effciency, record keeping and data storage and processing especially in number crunching departments like finance (treasuries) taxation (commercial taxes, Income tax, Excise), statistics, etc. substantial efforts and progress were seen in departments that dealt with large number of beneficiaries like rural development, PDS, etc. These efforts were largely spread over a couple of decades during 1976-96 and almost entirely based on NIC support, barring a couple of states like AP where NIC efforts were augmented by state technology organizations like APTS. It was in 1997 that the first steps towards a citizen focused e-governance program was taken initially in the state of Andhra Pradesh. Later, thanks to a strong push by the central Government and the birth of the National annual eGovernance conference series, the movement rapidly spread to several other states. The next decade saw the emergence of several egovernance initiatives in diverse areas like land records, transportation, land registration, urban local bodies, PDS, etc. at the state level and Income tax, Excise and MCA at the national level. Towards the end of this period, State Wide Area Networks were created under a scheme funded by the Central Government. Some of these projects were implemented in a PPP mode, thereby drawing the country's technology industry into the nationwide effort and opening new approaches to rapid deployment of comprehensive egovernance solutions. These sporadic, but highly visible initiatives were widely appreciated and hailed as truly path breaking changes in systems of governance in the country. The foundation for a comprehensive National eGovernance plan

had been laid through these efforts. Approval of the SWAN project and early discussions at the highest levels of Government on the contours of a National eGovernance plan took place in 2003. These efforts culminated in the approval of the National eGovernance plan and the game changing Common Services Centers project in 2006 by the Union cabinet. Thereafter steady progress was made across the country: faster in some states and much more slowly in others. During this period (2004-2013), some of the more ambitious projects like UID (later renamed as Aadhaar), passport seva, MCA21 etc. were initiated. Parallel developments in the telecom sector unfolded at a staggering, globally unprecedented pace. The country went from 100 to 1,000 million telecom subscribers in a little over a decade, broadband coverage was expanding and the National optical fiber Network (NOFN later renamed as Bharat Broadband) was launched. Smart phone coverage grew rapidly as did social media usage, especially by the young population.

Potential of Digital Economy

The advent of the present Government in 2014 was marked by a clear recognition of the huge potential of the digital economy. The Government took the digital push in the country to unprecedented levels with many spectacular initiatives that attracted global attention and drew praise. The Aadhaar project was taken to its logical conclusion by a vigorous drive, the JAM program (jandhan, Aadhaar and mobile) program saw over 200 million people benefitting from financial inclusion through bank accounts and direct benefits transfer (DBT). Linkage of mobile telephones and bank accounts with Aadhaar (recently barred by the supreme Court gave Government and businesses the ability to deal with a vast population individually and without leakage caused by nonvalue adding intermediaries the CSC program has expanded to 2,50,000 panchayats and naw provides employment to nearly a million people in the rural heartland. Technology can indeed be used to distribute economic opportunity and job creation more equitably. Meanwhile, global developments in technology led to the emergence and use at scale of enormously powerful, highly affordable, almost infinitely scalable disruptive technologies like Social Media, Mobile, (Data) Analytics, Cloud Artificial intelligence, 3D printing etc. The Indian IT industry had also grown immensely and had become a 150-billion-dollar behemoth that was globally respected and often envied. The last 5 years have seen one other major development, namely the rapid growth of the third largest start up ecosystem in the world with around 7,500 tech startups. After initially coming up with clones of western products in ecommerce, transportation, entertainment and hyper local logistics and deliveries, the startup eco system is increasingly creating innovative

products and services focused on solving Indian. Problems in healthcare, agriculture, cyber security, energy to name a few. Of course, many of these have a global potential even though they started off with an India focus. India is well on its way to becoming a fountainhead of frugal innovation for the globe by creating services in various areas, but more importantly in the social sector, by leveraging new disruptive technologies.

Digital Services Delivery

E-commerce, transportation, payment wallets, hotel/ accommodation/ cinema booking, local food and provision delivery services enabled by mobile apps are now familiar to most urban citizens and increasingly smaller towns as well. Global products like IBM Watson already provide a range of medical services across countries including treatment recommendations based on patients' records. But within India,well known products in healthcare such as practo, portea, lybrate, etc. are connecting doctors and medical professionals to patients in ways that make it easy to reach the right person from the comfort of your home. Apps like Byjus are making high quality educational content and services easily accessible at highly affordable costs. Similar established products albeit in smaller numbers exist in the agriculture sector too. But there are more new exciting efforts in the pipeline in social sectors like healthcare, agriculture, fintech/ financial inclusion that hold the promise of scripting India's future riding on the back of and reinforcing the Digital India program. Some examples would suffice to convey a sense of the range of innovation and extent of changes being ushered in by these young innovators and change leaders. Medicea technology solutions is building a tech driven pharmaceutical distribution business with next generation anti counterfeit technology using private block chain. Artoo has built an intelligent lending system specifically designed for micro enterprise lending. Dheeyantra has built a product that enables vernacular interactions and engagement with end customers using AI and NLP inform DS Technologies has built Doxper, an AI powered product that enables doctors to instantly digitize prescriptions and clinical notes using a digital pen and encoded paper. Krishi Hub is a free AI powered mobile app that enable farmers to make datadriven decisions and supports 8 local languages and is currently being used across 17 states. Deep Mind mines through medical records and analyses digital scans of the eye to diagnose eye disease. AI and Internet of medical things (IoMT) are transforming healthcare. Similar transformation in the agriculture sector through technology interventions that enable precisions farming, early warning of peat attack in cotton farming for example, are available through AI powered system to lower risks and costs while increasing productivity. It is

interventions like these and hundreds of other such innovations that are going to help deliver desired outcomes like doubling farmers' incomes and health coverage for the poor.

Regulating the Digital Revolution

The Digital revolution is often called as the fourth Industrial revolution, the first three being the steam Engine, followed by the age of science and mass production and computers. World over the Digital revolution is driving the socioeconomic and technology growth of the human race. The revolution is driven by various factors like the availability of high speed Internet, innovative products and services the need for effcient management and distribution of resources both by the government as well as private entities, the users' ubiquitous requirement of remaining connected at all times etc. As stated in the TRAIs recommendation on privacy security and ownership of the data in the telecom sector. The ecosystem used for delivery of digital services consists of multiple entities like telecom service providers (TSPs) personal devices (Mobile handsets, tables personal computers etc.) M2M (Machine devices, communication networks (consisting of base trans receiver stations, routers, switches etc., browsers operating system over the top (OTT) service providers etc. It is estimated that the global volume of digital data created annual was 4.4 zettabytes in 2013 and this would reach 44 zettabytes by 2022 further it is expected that the number of devices connected to the IP Network would be approximately three times the global population by 2021. It would be pertinent to note that the mode of communication has transformed from purely analog to digital now and mobile communication has become an inseparable part of our lives. The entire gamut of digital transformation is to provide innovative products and services to improve productivity and effciency. The connectivity to the digital devices would be predominantly provided by the telecom networks hence the telecom sector would be the key growth engine driving the Digital Revolution of India.

Technological Challenges

These are far too many and are dynamic in nature *i.e* issues related to data, digital privacy and security, data ownership, AI based challenges etc. One of the major challenges in the telecom sector today is to simultaneously regulate the legacy as well as the new digital networks. This requires framing of new set of regulations and frameworks that facilitate seamless coexistence as well as smooth migration. India is the second largest market in the world. Though a large number of initiatives have been undertaken both by the Government as well as the private sector but still a large population remains devoid of connectivity to the

internet. Spreading awareness as well as connecting every individual are keys to the socio economic metamorphosis of our country. As new business models and services emerge, government agencies are expected to create or modify regulations, enforce them and communicate the same to the environment at faster pace. The regulator is not only entrusted with the responsibility to ensure the compatibility of the new technology with the legacy frameworks but also foster innovation on the other. Regulation of IT is also necessary to provide a safe and clean environment for development.

Conclusion

India is witnessing the biggest transformation in the past decades with new technologies and services based on Digital connectivity and social media. Data analytics, cloud computing, IoT, applications are being increasingly designed and used in all sphere of life today. This development of technologies and services have removed all geographical boundaries, created exciting business models, created job opportunities, empowered the citizens and attracted world telecom leaders to India which has a very important role today in the global Digital revolution in telecom and IT sector but we must also be aware that emerging technologies are carefully regulated to avoid critical errors and misuse.

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