

# The Role of Digital Infrastructure in Socio-economic Development

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**Successful countries have developed their ability to innovate and learn by doing, by investing public funding to help finance research and development in critical areas. Everyone is involved – big and small, public, and private, rich, and poor. India has set itself an ambitious target of doubling its economy in five years to \$5 trillion. It has made many efforts to become more digitalised and Digital India Mission is envisioned to be created on digital security and trust. Building digital trust is a major effort for the whole society, trade, and also for people using digital services.**

**D**igital infrastructure has emerged as an equally or arguably a more significant infrastructure necessity, as compared to the traditional infrastructure necessities such as power, water, and roads. The COVID-19 pandemic has not only shuffled the global order, but it has also provided an impetus to the ever-expanding digital infrastructure.

Economies across the globe are charting ways to make their digital infrastructure – which comprises the physical resources necessary for the use of data, computerised devices, methods, systems, and processes – more resilient, agile, and futuristic. The digital

infrastructure has become indispensable to the functioning of a society and the quality of

life of its citizens. All over the globe, countries have leveraged their digital infrastructure to



Harnessing the power of Artificial Intelligence to achieve the delivery of quality education.

proactively respond to the ongoing pandemic.

Going forward, the resilience of a nation's digital infrastructure could be pivotal in successfully addressing adversities such as the COVID-19 pandemic. India, being one of the most populous countries in the world, is uniquely positioned in the global landscape and has the potential to become a leading force in the new world order.

With nearly half a billion internet users in India, a host of indigenous digital services, platforms, applications, content, and solutions, are expected to transform the digital ecosystem. India could potentially see a five-fold increase in economic value from digital transformation by 2025, representing an attractive opportunity for global and local businesses, startups, and innovators to invest in emerging technologies (like AI, Blockchain, or drones) in ways that are customised to India's needs.

The rapid adoption of frontier technologies such as Artificial Intelligence (AI), Blockchain, Internet of Things (IoT) and the advent of the COVID-19 pandemic, has placed the entire digital infrastructure under immense pressure. With the Government of India progressively working towards goals such as Smart Cities and Smart Health, it is crucial for the nation to augment its digital infrastructure, to effectively utilise the frontier technologies in economic development.



NITI Aayog launched a module to enable students to explore the fascinating world of AI

With increasing smartphone penetration, surging online activity and gigantic amount of data being generated, Data Centres could be of high importance for the world. Thus, it is the need of the hour to promote and create a framework for the development of robust digital infrastructure which could facilitate adoption of emerging technology areas such as 5G, IoT, artificial intelligence, machine learning, drones, robotics, additive manufacturing, photonics, nano-based devices, etc., and their applications in areas such as defence, agriculture, health, cyber security, smart cities, and automation, with special focus on solving real-life problems.

The global electronics market is estimated to be over US\$ 2 trillion. Although India's share in global electronics manufacturing has grown from 1.3% in 2012 to 3% in 2018, it is still considered to be miniscule as compared to that of the other countries. The electronics industry being a crucial part of the digital ecosystem of a nation, it is imperative for the industry and the government to make concerted efforts in this domain.

Semiconductors, being the building block of electronics, are key to India's electronics ecosystem. The absence of a state-of-the-art semiconductor fabrication facility in India has been a major infrastructure

challenge, which has hampered the technology growth in this domain. Semiconductor manufacturing is a complex and research-intensive sector, defined by rapid changes in technology, which require a significant and sustained investment. Semiconductors are not only at the heart of electronic products; they also constitute a significant part of the total value of the Bill of Materials (BOM).

The recent expression of interest for setting-up/expansion of existing semiconductor wafer/device fabrication (fab) facilities in India or acquisition of semiconductor fabs outside India by the Ministry of Electronics and Information Technology is a welcome step. However, it is believed that acquiring a second-hand fab of 28 nm, could take care of a large part of India's current need, instead of going after the most modern fab. This will not cost more than US \$500–700 million. In addition, a thrust on semiconductor fab manufacturing, including a GaN fab, with a milestone-based, time-bound approach, is also recommended.

Urbanisation and emergence of smart cities is a major trend, which heavily relies on the global economy driven by megacities like New Delhi, Mumbai, Bengaluru and Hyderabad. A recent McKinsey study indicates that over 60% of the world's GDP is being created in 600 cities around the world.

This will have a huge impact on

**India's digitisation efforts through platforms such as Aadhaar, UPI, GST, public finance management system and digital infrastructure has created a unique opportunity for AI to be leveraged to increase transparency and improve governance**

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the global economy, and building a smarter society is vital for success and growth. Amsterdam is a very good example of a smart European city, with extensive digital infrastructure and fibre connectivity, several Internet exchange points creating good connectivity between companies and people, and an impressive number of digital companies, startups and data centres forming a strong cluster for a smart city concept.

## Digital India

India has made many efforts to become more digitalised and Digital India Mission is envisioned to be created on digital security and trust. Building digital trust is a major effort for the whole society, trade, and also for people using digital services.

## Connecting the world

The world needs security and trust, but it also needs new innovations. A simple example of mobile phones has changed the way we work and interact predicts something about future with augmented reality making

better drivers or operators of cars, healthcare applications, and people being able to be their own doctors. All of this is heavily dependent on how well systems work, how interoperability is ensured, and how standards and protocols enable us to trust the applications used. These data-intensive machines and factories are run in data centres, which are better connected, and business becomes more global than ever. Therefore, we have to build more connectivity and the digital bridge with traditional systems and processes will become more essential. Infrastructure will act as the key for overall development, and digital infrastructure will be the key to economic development in the future, just as roads and railroads were the creators of past industrial successes.

## The initiatives of the Indian Government thus far

India has set itself an ambitious target of doubling its economy in five years to \$5 trillion. Global macroeconomic factors coupled with a cautious outlook and muted domestic consumption



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poses a serious challenge to achieving that ambition.

The moment has come for us to think out of the box. We need to break the old paradigms of economic growth and development by injecting technology-led innovation into our DNA. Especially, as digital economy alone can support 60-65 million jobs in the future, fuelled, of course, by government policies, support, and initiatives. Some of the major initiatives include:

- The Digital India programme is one of the major initiatives of the Government, which has had a tremendous impact on the national digital infrastructure. Under this programme, the government aims to provide high-speed internet connectivity across the length and breadth of the country. In addition, it also

aims to establish and leverage the unique identity (Aadhar) as a mode to ensure digital identity, financial inclusion, and easy access to the Common Services Centres (CSCs).

- The pervasive platform of 3.59 lakh CSCs with presence in 2.3 lakh gram panchayats has become a robust movement for digital delivery of services ranging from banking to insurance to pension to land records to Bharat bill payments and a host of others. CSCs are delivering 50 Central and more than 300 State services. In this process, CSCs have generated employment to more than 12 lakh persons in rural areas.
- Some of the transformative digital platforms under Digital India include Bharat Interface for Money-Unified Payment Interface (BHIM-UPI), Government e-Marketplace

(GeM), Goods and Services Tax Network (GSTN), Digital Locker (DigiLocker), Unified Mobile App for New-Age Governance (UMANG), Jeevan Pramaan, e-Hospital, MyGov, e-National Agriculture Market (e-NAM), Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) and National Scholarship Portal (NSP). These solutions are indigenously developed and based on low-cost technology.

- The Unique Identification Authority of India was created with the objective to issue Unique Identification numbers (UID), called 'Aadhaar', to all the residents of India. The UID had to be (a) robust enough to eliminate duplicate and fake identities, and (b) verifiable and authenticable in an easy, cost-effective way. The Authority has so far issued more than 124 crore Aadhaar numbers to the residents of India.
- Aarogya Setu is a digital service, primarily a mobile application, developed by the Government of India and is aimed at protecting the citizens during COVID-19. It is designed to augment the initiatives of the Government of India by informing the people of their potential risk of COVID-19 infection and the best practices to be followed to stay healthy, as well as providing them relevant and curated medical advisories, as per MoHFW and ICMR guidelines, pertaining to the COVID-19 pandemic.

Aarogya Setu enables early identification and prevention of potential risk of infection, through contact tracing, and thus acts as a shield for you, your family and your community. In addition, when you take the self-assessment test on the Aarogya Setu app, by correlating the symptoms that you report along with your location information, the Government of India will have the ability to identify potential hotspots (where disease may be spreading) early enough, so that necessary interventions can be done to control and mitigate the spread of COVID-19.

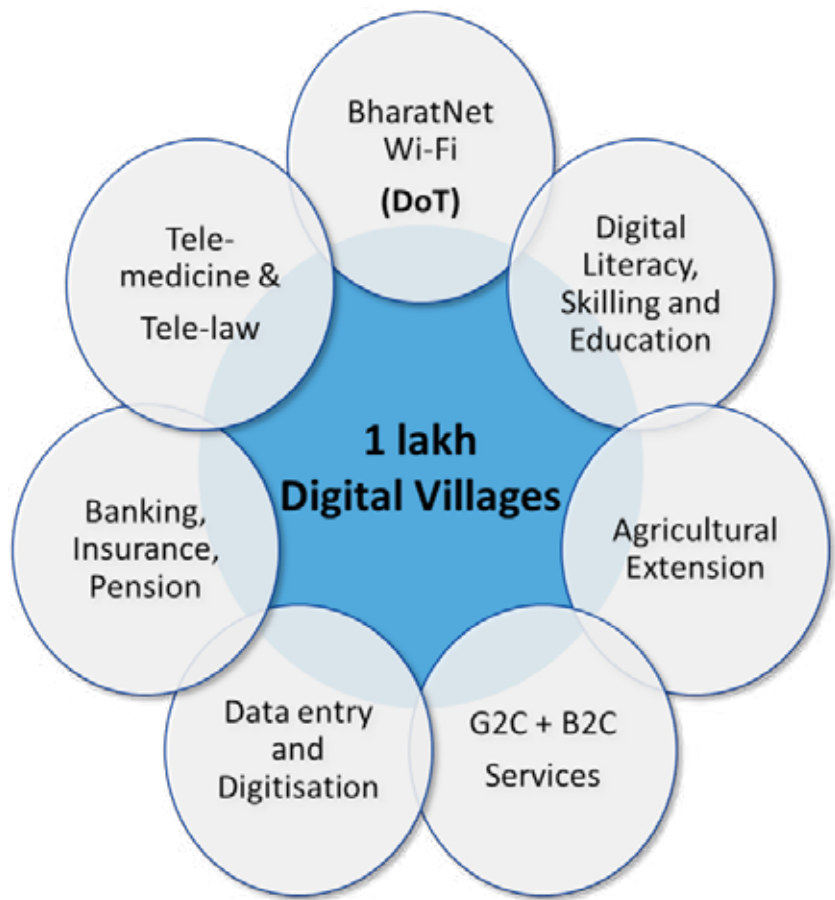
- DigiLocker is enabling paperless governance by providing digital space for 3.2 crore users for their more than 369 crore documents. Providing services to 1.64 crore farmers, the e-NAM has integrated 585 agricultural mandis and has undertaken transaction of orders worth Rs 70,000 crore.
- MeghRaj: In order to utilise and harness the benefits of Cloud Computing, the Government has embarked upon an ambitious initiative – GI Cloud, which has been named MeghRaj. The focus of this initiative is to accelerate delivery of e-services in the country, while optimising ICT spending of the Government.
- The education system is poised to be transformed by use of SWAYAM, providing more than 2,000 open courses, and SWAYAMPARBHA, a group of

32 DTH TV channels devoted to telecasting of high-quality educational programmes.

- Further, initiatives like e-Hospital are changing the landscape of health service delivery. Using this, 11.8 crore registration-related transactions have been undertaken and 322 hospitals have been integrated.
- Promoting social inclusion and touching lives of 2.58 crore pensioners, the Jeevan Pramaan service has enabled them to submit life certificate digitally from anywhere, anytime basis.
- Government e-Marketplace

adopted by all government departments/agencies, with comprehensive coverage of buyers, sellers, and service providers, and end-to-end digital enablement from tendering to payment and fulfilment. Ensuring transparency in public procurement to a new high, GeM has achieved availability of 13.81 lakh products, 2.9 lakh sellers and service providers. For the first time, many sellers from small towns are participating in public procurement due to end-to-end digital transformation under GeM.

- Moreover, under the



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*Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)* which aims to make at least one person per family digitally literate, 2.27 crore persons have been trained.

- MyGov has laid the robust foundation for citizen engagement and participatory governance in the country by providing a common digital platform, where citizens can share their views on government programmes and schemes. 95 lakh active users have contributed on MyGov platform wherein 40 lakh comments have been received in 800 discussion threads.
- Taking mobile services to a new level, the UMANG mobile app, downloaded by more than 1.5 crore users, has integrated 490 services from 104 departments and 21

states on a single platform.

- The Government has set up National Centres of Excellence at the Indian Institute of Technology (IIT) Bombay for technology solutions in internal security and at the IIT Kanpur for flexible electronics. The Government has also set up a Centre of Excellence in Bengaluru in collaboration with the National Association of Software and Services Companies (NASSCOM) Internet of Things (IoT). Those measures are also expected to bring cutting technologies.
- Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme has been notified on 1 April 2020 with an objective to address the disabilities, by providing support for creation of world-class infrastructure along with common facilities and amenities, including Ready-Built Factory (RBF) sheds/ plug-and-play facilities for attracting major global electronics manufacturers along with their supply chain to set up units in the country.
- The Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS) dated 1 April 2020 will help offset the disability for domestic manufacturing of electronic components and semiconductors to strengthen the electronics manufacturing ecosystem in the country.
- Production-Linked Incentive Scheme (PLI) for Large Scale

Electronics Manufacturing dated 1 April 2020 offers a production-linked incentive to boost domestic manufacturing and attract large investments in mobile phone manufacturing and specified electronic components, including Assembly, Testing, Marking and Packaging (ATMP) units.

- The National Policy on Electronics 2019 (NPE 2019), prepared after extensive stakeholder consultation, envisages to position India as a global hub for ESDM with thrust on exports 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 vibrant IT-BPM, telecom, e-commerce, and electronics sectors, the explosion of new digital startups equipped with technologies such as virtual reality (VR), augmented reality (AR), Blockchain, Artificial Intelligence (AI), robotics, analytics, automation, cloud, cyber-security – mobile, and social – could help to achieve close to \$250 billion in gross value added by 2025.

India is one of the world's fastest growing markets. The country is witnessing a massive increase in internet users especially in tier-2 and tier-3 cities, towns, and villages. Increased availability of bandwidth, cheap data plans and increased awareness is bridging



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the digital gap between urban and rural India.

There is a government push towards digitalisation indicated by the launch of AI-oriented government initiatives like the AI Task Force and NITI Aayog – and these efforts are needed to spurn more artificial intelligence enthusiasm, companies, and research investment.

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To leverage this potential, we need to focus on employment generation and growth in consumption, increase public spending in infrastructure, especially rural infrastructure, to optimise the market potential of non-urban India, invest in

manufacturing, especially in the MSME segment, and improve access to services. The key sectors would be manufacturing, education and healthcare with programmes such as Digital India, Make in India, Startup India and *Ayushman Bharat*, creating an inclusive environment. Technology will be the glue that will bind all of these and deliver the future.

## Enabling opportunities for India

India has been steadily rising in the Global Innovation Index (GII) rankings and is currently ranked in the 57th position (2018). The power of the 3rd largest scientific and technical manpower in the world has MNCs like Samsung, Bosch, Microsoft, CISCO, and many others have started focussing on India to leverage the capability India has to offer.

- **Young country with rising expectations:** Working-age population (between 15 and 64 years) to touch 1 billion, surpassing China by 2030; 65% of India's population is below the age of 35.
- **Employment challenge:** Need 12 million new jobs a year to absorb growing working population; 50 million people need to be skilled each year; current capacity is only 3 million.
- **Growing middle class seeks new value propositions:** By 2021, India will have about 900 million people constituting the 'emerging middle and middle class' segment, which will provide new opportunities.
- **Winning in this market:** For this, companies will need to deploy a shift in mindset to achieve new value propositions delivered through innovative business models.
- **India's gross expenditure on R&D (GERD):** It increased from Rs 65,961.33 crore (US\$ 14.07 billion) in 2011-12 to Rs 104,864.03 crore (US\$ 16.27 billion) in 2016-17.

Successful countries have grown their ability to innovate and learn by doing, by investing public funds to help finance research and development in critical areas. Everyone is involved – big and small, public, and private, rich, and poor.

## Opportunities and way forward

India's digital divide is

narrowing fast, as less affluent states leapfrog to catch up with more affluent states. India can create up to \$1 trillion of economic value from the digital economy by 2025, with half of the opportunity originating in new digital ecosystems that can spring up in diverse sectors of the economy.

E-commerce platforms are expected to drive recovery of consumer electronic products – mobile devices, smart TVs, LED lighting, etc. – faster and having a robust manufacturing ecosystem is essential to adequately

address the indigenous demand. An immediate need to develop local supply chain networks has been recognised and efforts in this direction could adequately support the indigenous electronics manufacturing.

Industry should develop short-term strategies on quarterly basis and calibrated decision-making, to address disruptions caused due to the COVID-19 pandemic. The 'Atmanirbhar Bharat' policy could give the much-needed fillip to the country's disrupted business operations by promoting indigenous manufacturing,

encouraging substitution of imports of low-technology goods, and encouraging local produce at lower prices.

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