

State-of-the-Art Digital Innovation in India

Introduction

Digital transformation is re-inventing the world as we know it. Globalization has placed pressure to re-build the world on the foundation of technology. Each industry, business and enterprise now faces a choice between innovation and extinction. Digital transformation is not just about technological advancements and introduction of artificial intelligence, but also includes futuristic digitally evolved growth culture for every business, large or small. India is not far behind in this modern digital renaissance it has embraced technology in a way that is paving path for the global south to traverse on. Since 2015, India has come to be recognized as the hub of digital innovation across the globe. According to the Global Innovation Index published in 2021, India is ranked 46th in terms of innovation capabilities amongst developing economies. Over the past few years, with the initiation of the 'Make in India' and 'Digital India', a thriving culture of entrepreneurship has developed in India. According to a report published by Forbes India in 2021, a record 42 Indian start-ups were valued at over \$1 billion last year, behind only the US and China.

Digital Innovations and adoption of state-of-the-art infrastructure in the Government Sector

Besides the revamp of the IT industry and start-ups, India has been abreast with adopting state-of-the-art technologies in all public and private sectors. National Informatics Centre (NIC) under the Ministry of Electronics and Information Technology has been a major contributor towards providing state-of-the-art technological advancements, building solutions, as well as advising individual sectors on action plans and adoption of appropriate technologies.

India has adopted a centralized systems to help create a national-level data registry/databases. Given the advancement in technology, India today has various national registries including the ones for driver's licenses, national vehicles, public distribution beneficiaries, and health registries. The eChallan, e-Way Bill and eTransport projects are just a few examples of the benefits of the national registry system adopted by India.

A robust payment system has been developed; the Public Finance Management System (PFMS) which creates a safe, secure, efficient platform for the government of India, enables a successful payment mechanism directly from the government treasuries and program agencies into the beneficiaries' accounts. According to an article published by the Economic Times on the 3rd of June, 2022, despite receiving heavy criticism in recent few years, *"the Aadhaar-enabled Public Distribution System has enhanced food security throughout the country by making food available to more than 330 million poor people at affordable prices."*

The eCourts system and The National Judicial Data Grid (NJDG) has revolutionized the Indian Judicial System. It has not only fast-tracked the justice delivery system but has also brought in transparency in the country's judicial system. Tracking pending litigation at the Supreme Court, High Court and district level by various stakeholders including researchers, academicians, and general public at large has opened doors for a more efficient judicial branch.

India is on the path of digital transformation and some of these technological advancements have been made in the Indian pharmaceutical industry whereby in 2021, the industry showed a double digit growth

after the pandemic struck the world. The 'Engage with Science' project was launched in November 2021, the Atal Innovation Mission and Vigyan Prasar collaborated to create a unique platform for young adults. A state-of-the-art technology was launched by ISRO in July 2021, ISRO; the geo-imaging satellite 'EOS-03', it will enable near-real time monitoring of natural disasters such as floods and cyclones. The Deep Ocean Mission (DOM), approved by the central government is a multidisciplinary project to develop deep-sea technologies in order to conduct various deep sea research and explorations. The 'gamma irradiation technology' for food preservation is another such project which marks India's quest towards digital innovation and adoption of state-of-the-art technologies.

Digital Innovations and adoption of state-of-the-art infrastructure in the Private Sector

In what is being called the fourth industrial revolution, India appears to be making a leap of faith with technologies such as artificial intelligence (AI) being infused into the society at an exponential rate. Covid-19 infused lockdown only accelerated the digital transformation pushing India towards digital literacy and innovation. India has not only started investing its stakes in Quantum Technology but has also outsourced private players to develop its Quantum Computing projects. It is anticipated that 2022 will see a development of 'neuromorphic computing' which, applying insights from neuroscience, will be able to stimulate human intelligence and mimic human capabilities with its vastly expanding potential. India's healthcare infrastructure will be greatly helped by this state-of-the-art technology as it solves its overbearing problem of understaffing.

Another reason for India's accelerated digital growth is its consumers. Data is the new world currency and the amount of data being consumed by India is staggering. According to an article published by the Offices of Science and Technology in 2021, *"Indian mobile data users consume 8.3 GB of data each month, compared with 5.5 GB for mobile users in China. India is likely to see an increase in the number of internet users by about 40 percent to between 750 million and 800 million and a doubling of smartphones to between 650 million and 700 million by 2023."* The digitalization of the Indian economy has augmented the consumption and production of data. Buying, selling, creating, capturing and delivering data has become a multi-million dollar industry in India. In order to satisfy this vast need of consumption, India is also looking towards developing and strengthening its public cloud platforms. India's public cloud services market includes infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS) solutions, and software-as-a-service (SaaS).

Ever since 2020, India is moving towards developing its new age digital ecosystems and markets. Big players like Amazon, Flipkart, Nykaa, Myntra, Zomato, etc., have brought internet enabled services to the very doorstep of the Indian population. The high speed connectivity is rapidly modernizing the various public and private sectors of the country. According to an article published in The Hindu in December, 2021, *"an ecosystem consortium has recently embarked on a seminal project called iRASTE (intelligent Solutions for Road Safety through Technology and Engineering). Leveraging the power of AI, it aims to achieve up to a 50% decline in road accidents in Nagpur city over the next two years and create a blueprint to Vision Zero for the country."* Another development includes the smart, cloud-to-edge-connected, 5G-enabled automobiles which will have numerous benefits. It would increase road safety by its cutting-edge technology, creating standardized driving conditions. The artificial intelligence (AI) based automobiles will transmit real-time traffic updates and road conditions including updating the user about parking space availability. It will further reduce the country's great dependency on fuel consumption. The government's 'Smart Cities Mission' to create a more tech-enabled nation is furthered by the CAS (collision avoidance systems) and ADAS (advanced driver assistance system) technologies included in this vast project.

Another concept the world is abuzz with is the Metaverse; a recent concept in the digital innovation world which has considerable controversy surrounding it. It is an augmented combination of a virtual and reality based environment which can be accessed and interacted with in real time. These innovations have given the gaming and entertainment world as well as the military and defence services something to look forward to.

The accelerated growth at which India is progressing, it could take a leading role in this field provided it overcomes its operational challenges. India is still in the nascent stage of developing regulations to create a safe and secure platform for transfer of digital assets including cryptocurrencies which may be required for development of the metaverse. This also brings us to the question whether metaverse will bring about meta-governance? The world of metaverse raises policy question including digital literacy, safety, privacy and security. Governance mechanisms for the virtual world will need to be developed and strengthened so that stakeholders can engage and participate in meaningful interactions without being constantly worried about their wellbeing.

The first microprocessor was launched fifty years ago and only in fifty years, the world has seen a revelation in terms of technology and digitalization. Technology has never been more important to humanity and its development. The technological challenges we are facing in the 21st century are truly existential. The pace of innovation will continue to accelerate and soon computers will become more human-like stimulating human intelligence. We will find new and innovative ways to introduce AI, cloud-edge infrastructure and state-of-the-art technologies in our day to day lives. New ways to build on these pillars will create and develop world revolutionizing technologies and power India towards a new dawn pushing it to become a trillion dollar digital economy in a few years.