Digital India: Power to Transform

Digital India: The humble beginning

Governance is a challenge in a country as vast, diverse and rapidly developing as India and that is where new technologies intervene and enable large-scale transformation thereby ushering in the implementation of ambitious plans. Governments have been formulating innovative ways to usher in progress for the benefit of the common citizens and they rely on the establishment of base level infrastructure and smart solutions to translate its vision into reality. Among developing countries, India had been an early adopter of e-governance and in fact egovernance in India could be traced back to 1970s. It, initially, emerged in the field of defence, planning, taxation, elections, census and monitoring . The establishment of NIC in 1977 and initiatives like NICNET in 1987 which was a national satellite based computer network took the country to the next level of electronic governance. Finally, with the establishment of the IT ministry in 1999 eGovernance was an established norm to take India to the electronic age.

Driving the digital transformation

India is currently witnessing a dramatic digital transformation. With more than 566 million internet users (Dec 2018)[1], and billions of digital transactions. India's digital landscape could undergo monumental changes by 2020, as internet users are expected to reach 730 million and digital payments to USD500 billion[2]. The country is also planning to launch 5G services by 2020.

It is to note that Indians have 1.2 billion mobile phone connections and the Indian average monthly mobile data consumption has crossed 8.3 GB, compared to around 5.5 GB for mobile users in China and 8.0 GB in South Korea. Indians have downloaded more than 12 billion apps in 2018 alone[3]. This transformation is largely driven by the government's ambitious plans towards digital initiatives. The availability of affordable smartphones, is expected to continue in both rural and urban areas in the coming years this is one of the main factors for the success of digital initiatives. The penetration of the internet has transformed the business landscape of both citizens and organisations by providing them with opportunities across all the dimensions of affordability, access speed and data volume.

The rate of growth of digitisation in India is faster than any other country and still it has a plenty of room for growth as currently only just over 40 percent of the populace has an internet connection. The expansion to the other half of 60 percent is likely to give rise to opportunities in retail, healthcare, education, transportation, logistics, almost every sector is adopting new and emerging technologies to transform their businesses. Digital transformation is expected to add an estimated $154 billion to the Indian GDP[4], according to International Data Corporation. It is estimated that in the coming years almost 60 per cent of Indian GDP would be linked to digital products from a 4 per cent in 2017[5]. These developments would further boost the digital economy, which could reach USD1 trillion by 2025[6]. Further, these advances could have significant implications across myriad sectors such as retail, manufacturing, banking and finance, etc., thus driving India's economy forward.

India's digital challenge and narrowing the digital divide

The implementation of digitisation in such a diverse environment as India especially to deliver and impact governance is riddled with challenges. The scale of operations, the resistance to change to new technologies and the need for transparent operations at all levels are the key objectives that the government needs to contend with. The core pillar in this transformation includes the development of new technology infrastructure whose ultimate objective is digital empowerment of citizens to deliver clean governance and services on demand which in turn empowers every citizen at any point of time and thus offsets the burden of inequitable access amongst the weaker sections of the society. Indians particularly in small towns and villages are now reading news online, they order consumer products via phone apps and enjoy online shopping. A new way to communicate via video chat is fast on the ascent. Sending money to a family member is as simple as tapping their phone, or watching a movie streamed to a handset.

1. ICUBE 2018 report that tracks digital adoption and usage trends in India, it noted that the number of internet users in India has registered an annual growth of 18 percent and is estimated at 566 million as of December 2018.
2. economictimes.indiatimes.com/industry/telecom/indian-digital-payments-market-to-reach-500-bn-by-2020/articleshow/53383930.cms
3. https://m.economictimes.com/tech/internet/internet-users-in-india-to-rise-by-40-smartphones-to-double-by-2023-mckinsey/articleshow/69040395.cms
4. https://www.forbes.com/sites/baxiabhishek/2018/04/30/digital-transformation-predicted-to-add-154b-to-indias-gdp-over-next-3-years/#62d6b3825b5a
5. www.hindustantimes.com/tech/digital-transformation-will-add-154-billion-to-india-s-gdp-by-2021-microsoft/story-qmV95nousJ4MPXbtA4uYAM.html
6. www.businesstoday.in/pti-feed/indias-digital-economy-seen-at-usd-1-trillion-by-2025-official/story/352587.html

In this scenario both the private as well as the public sector have shared interest and are working together on promoting digital usage. It is businesses which are driving the digital adoption particularly in the urban setting. Digital adoption is more intense currently in the tier towns and cities, this has induced a digital divide between the rural and urban geographies, the next level challenge is to bridge this digital divide. It has been estimated that by 2025, core digital sectors could double their GDP level to almost USD435 billion[7]. The silver lining to all of these estimates is that it points to an immense digital economy which could unlock trillions in business opportunity. However, it must also be noted that there are certain key sectors, whose payback is far more than financial opportunities. These sectors contribute to the economy in both direct and indirect ways by way of not only production but also by adding value to other sectors. These sectors, in turn would need special attention and more support from the government and other stakeholders. The special focus sectors and the way forward has been detailed out subsequently.

Transforming agriculture: Enabling a new green revolution
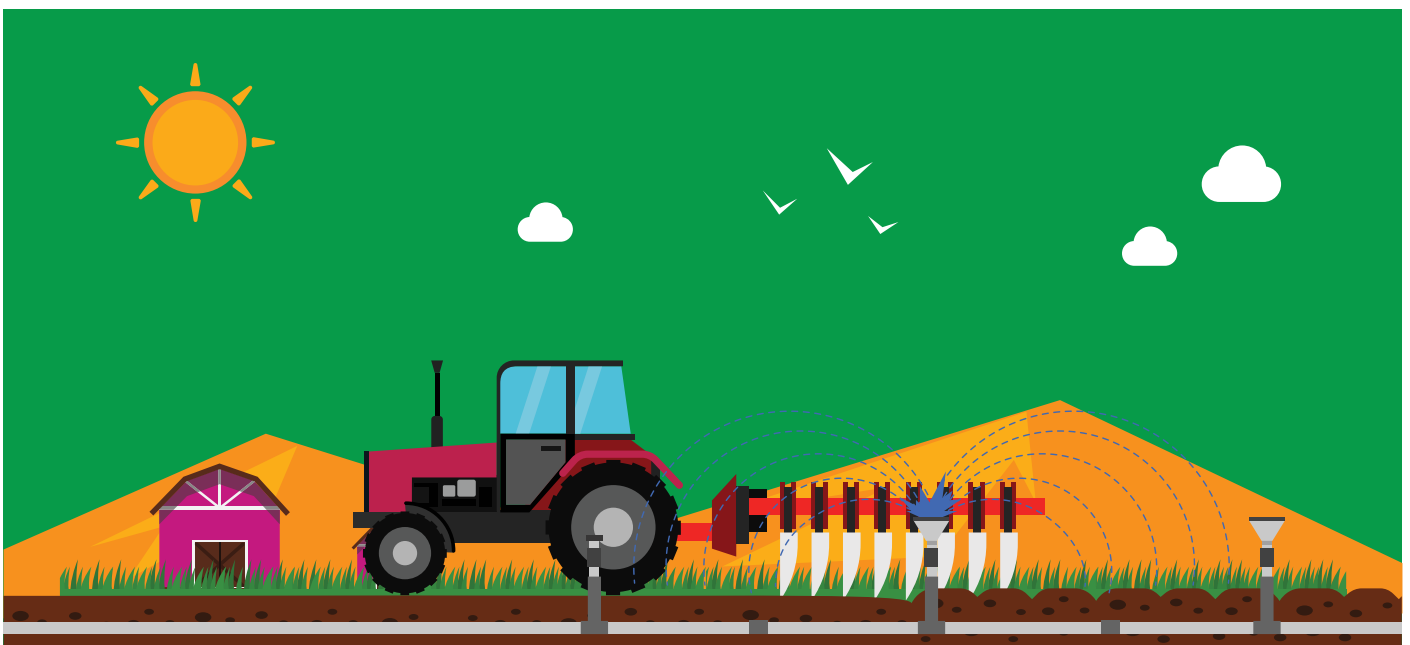
The Indian agriculture sector is still in a nascent stage in terms of adoption of digital empowerment and new technology. However, India being an agrarian economy with about 60 per cent of rural households being dependent on agriculture for their livelihood[8] is one great opportunity to explore transformation. Apart from being the world's second- largest producer of fruits and vegetables, the country is the largest producer of milk, second-largest producer of sugar, and the leading country in terms of coconut production.[9] However, the contribution of agriculture to the country's Gross value added (GVA) has been continuously declining since FY14 and is expected to be around 3 per cent in FY18.[10] Agri-tech has the potential to address a number of challenges faced by the sector and, subsequently, change the face of the Indian agriculture.

7. economictimes.indiatimes.com/news/economy/indicators/digital-adoption-may-result-in-strong-economic-growth-in-india-mckinsey-report/articleshow/68600887.cms
8. 12 Indian Agri-tech Startups To Watch Out For In 2018, inc42, 29 December 2018.
9. Digital Technologies Transforming Indian Agriculture, WIPO, 7 June 2017.
10. Monsoon blues, Business Line, 17 April 2018.

Transformation of agri-tech in India

Rise of start-ups in agri tech

The Indian agri-tech sector is evolving with the emergence of several start-ups engaged in modernisation of the agriculture sector. Furthermore, a number of start-ups have emerged recently, which are engaged in providing innovative and sustainable solutions to challenges faced by farmers. These solutions include biogas plants, fencing and water pumping facilities, weather prediction service, solar-powered cold storage, equipments such as spraying machines and seed drills.[11]

Government focus on agri-tech

In a bid to boost the agri-tech sector in the country, the Ministry of Agriculture launched a first-of-its-kind Agriculture Grand Challenge in December 2017. The initiative aims to benefit agri-tech start-ups through incubation, mentoring, and providing access to markets to help solve some of the key challenges plaguing the agriculture sector.[12] Some of the other key initiatives by the Indian government include AGRI UDAAN program, setting up a dedicated agri-tech infrastructure fund, digital India, launch of e-National Agriculture Market (NAM) portal, etc.

Upsurge in internet and smartphone penetration

With increasing internet usage and rising smartphone penetration, agri-tech organisations are now able to offer information, techniques, and efficiencies to farmers both for pre-harvest applications and post-harvest usage.

Rising investments and prevalence of substantial opportunities in the domain can boost the growth of agri-tech organisations in the country.

The United Nations has predicted that, in order to meet the growing demand, the world would need to produce 70 per cent more food in 2050, than the current production value.[13] Technology is expected to play a key role in increasing the agriculture output in the coming years. The global precision farming market is expected to cross USD5 billion by 2023, registering a CAGR of more than 10 per cent from 2016-2023.[14] The global agriculture robots market is expected to increase from USD3 billion in 2016 to USD11 billion in 2023, witnessing a CAGR of about 21 per cent.[15] A number of global organisations are engaged in making use of latest technologies such as Artificial Intelligence, Internet of Things (IoT) and Big Data to develop new solutions for agriculture. Similar to the global trend several organisations in India are engaged in devising new agri-tech solutions. About 10 per cent (USD313 million) of the global investments in agriculture were garnered by 53 Indian agri-tech start-ups in 2016. There are significant opportunities for Indian agri-tech organisations in areas such as enhancing crop production, augmenting the nutritional value of the crops, improving the overall process-driven supply chain, reducing the input prices for farmers, and minimising wastage in the distribution system.[16] Furthermore, India's population is expected to reach 1.4 billion by 2020. The increasing population, along with rising income levels, would generate increased demand for food and non-food crops in the country. Agri-tech organisations could prove to be effective in bridging the demand–supply gap existing in India[17].

11. Agri-tech India: Towards Doubling the Farmers Income, Tech Story, 20 December 2016.
12. Government invites Agri-tech startups to resolve sector issues, Your Story, 16 February 2018.
13. Global IIoT Market in Agriculture 2017, PR Newswire, 8 January 2018.
14. Precision Farming Market grow at 10per cent CAGR from 2016 to 2023, Agri-tech Tomorrow, 19 July 2017.
15. Agricultural Robots Market ;PR Newswire, 2 November 2017.
16. How Startups Are Changing The Face Of Indian Agriculture, Inc42, 16 June 2017.
17. Agri-tech India 2018, Agri-tech India, accessed on 8 February 2018.

Challenges

As agri-tech makes inroads into rural India, entrepreneurs may encounter a set of new challenges which could hinder their reach and effectiveness. Factors such as lack of awareness about new technologies, cost of technology and low computer literacy impede the growth of adoption of technology by farmers in rural areas.

Lack of awareness: The reach of technology is very limited and unevenly distributed across the country, as farmers lack awareness about new technologies and are still practicing old techniques.

Cost of technology

Affordability is one of the key factors which inhibits the growth of technology adoption. Small and marginal farmers do not have enough funds to purchase new technology-based products and are, thus, left out of its ambit.

New middlemen: Owing to the digital divide and low literacy rate amongst farmers, a new class of middlemen has emerged who provide Information and Communication Technology (ICT) services to farmers. These middle men could distort information for personal benefit[18]. In addition challenges such as lack of infrastructure, low connectivity, and lack of training in modern techniques and technologies could act as growth hurdles for agri-tech start-ups.

Way forward

Increasing population, rising income levels, growing exports and increasing consumption could drive the demand in the agriculture sector. In addition, continuous government and local support as well as investments from foreign VCs has set the agri-tech sector on a healthy growth path in India. The need is for all the stakeholders coming together to build a sustainable ecosystem for the growth of the sector.

Transforming healthcare: Leveraging technology to enhance healthcare

Beginning of a digital era in healthcare

In recent years, several technological innovations have significantly transformed the Indian healthcare ecosystem. The country's rising population, scarce human resources, inadequate infrastructure (0.9 beds per 1,000 patients), coupled with a low doctor- to-patient ratio (0.62 doctors per 1,000 patients), lead to an increased demand for advanced integration into healthcare. Digital adoption and literacy could facilitate the growth of healthcare market from USD110 billion as reported for 2016 to USD371 billion by 2022.[19] Exponential growth has been witnessed in several health-tech start-ups that reached approximately 320 in 2017 from 250 in 2016. The total funding for these start-ups grew from USD70 million in 2016 H1 to USD160 million in 2017 H1, thus showcasing confidence within the investor community in this segment[20].

Adoption of technology in the Indian healthcare sector

Technology adoption in India has its own share of challenges. Low IT budget in hospitals, lack of in-house IT expertise, slower adoption rate by doctors, unavailability of regulations, and cyber-attacks may act as impediments for organisations looking to invest in advanced technology products or services in India. In addition, the growing health insurance sector in India is likely to increase the demand for more efficient systems for storage and retrieval of information[21] . Local investors and digital start-ups in India have focussed more on e-commerce, appointment setting and telemedicine services, whereas global investors are getting more attracted towards other segments like mobile health, wearables and big data.

18. Transforming agriculture with e-technology, The Hans India, 22 May 2017.
19. Indian healthcare market to hit $372 billion by 2022, The Times of India, 3 December 2017.

20. Fintech, healthcare startups most sought after, Fortune India, 7 November 2017.
21. Emerging trends in Indian Healthcare – Technology to become a core function, Wipro: DandB Research, 2018.

outcomes.

Opportunities for technology in healthcare[22]

Collection of health data

There has been an increased interest from several stakeholders to initiate collection of health data to assist healthcare providers with better clinical, economic and humanistic outcomes[23].

Mhealth and wearable devices

The demand for these wearable devices is likely to increase, driven by rising number of chronic disease patients, who require constant monitoring and check-ups.

Online appointments and e-consultations

There is a focus on the appointment booking segment by digital start-ups via online portals and mobile apps.

Telemedicine

It can tackle India's healthcare accessibility and affordability challenges, especially in tier-II and tier-III cities where quality tertiary care is not available.

E-commerce for healthcare products

There is an increasing interest in products for elderly, hospital care as well as maternity. There are increasing number for health oriented ecommerce websites on the rise in India due to the niche requirements.

Consumer health

There is a significant increase in demand for products like advanced hair care, maternity care, nutraceuticals, baby products and senior care; and online channels can serve as a key channel for selling these products.

India's digital health ecosystem is still at a nascent stage, and requires substantial investments and expertise through collaborations from both private and government sectors. There is a need to develop a framework for a smart healthcare system, and to use technology to improve clinical outcomes, healthcare delivery, patient safety and engagement. These digital healthcare platforms are pivotal to fundamentally reshaping the delivery of India's healthcare.

22. 7 key market segments of digital health in India, Dr. Hempel Digital Health Network, 01 July 2017.

23. Innovative Trends that will Transform Healthcare Industry in 2018, Entrepreneur India, 2018.

Transforming education and skilling – Digitally innovative learning for the masses

Technology is enabling the education system to explore new dimensions effectively and efficiently, as it allows personalised learning, builds capacity and drives decisions based on real-time data. Technology impacts three core issues of the education sector – access to quality education, effective learning and personalisation – at scale. India has the world's largest K-12 education system, with more than 260 million enrolments today, which have risen at a CAGR of about 20 per cent during 2011–15[24]. This is the largest user segment for learning in India. India's online education industry is expected to grow exponentially to touch USD1.96 billion by 2021 from USD247 million in 2016[25], majorly driven by increased consumer adoption supported by changing business models and improvements in product offerings. The technology- driven Indian education technology (Ed-tech) sector has propagated innovative learning products and promoted better learning experience leading to an enhanced acceptance of alternative modes of learning in India.

Advancements in the ed-tech industry

With the evolving dynamics, key recent trends in the ed-tech industry are as follows:

Virtual Reality (VR) and Augmented Reality (AR): Provides experiential learning through graphical simulation and gamification, increasing engagement and retention

Data analytics: Increasing digitisation and availability of augmented data is enabling new teaching methodologies with deeper insights

Machine Learning and Artificial Intelligence: Enables uniform learning experience for students through personalised content based on individual learning capabilities

Virtual classrooms: Virtual classrooms have emerged as an asset–light model for offline players to expand their network across geographie**s**

Growth drivers: Rising internet penetration and technological advancements are largely facilitating the rapid evolution of the education sector in India

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24. Online education in India, a study by KPMG in India and Google, May 2017.

25. Education startup Oliveboard surpasses 2 m subscribers in India, Business Standard, 20 January 2018.

Ed-tech industry is expected to witness further transformation driven by:

Cost effectiveness of online courses	The associated cost in traditional education is much higher as compared to that of online education system. Online skill enhancement courses are about 53 per cent cheaper than offline courses[26].
Rising enrolments aided by e-learning	The government is targeting a Gross Enrolment Ratio (GER) of 30 per cent by 2020[27]. E-learning aided by advanced technologies could meet the additional requirements and assist to reduce the supply gap.
Demand for specialised professionals and higher competition for professional courses	In the wake of rising employee layoffs and scarcity of jobs, online courses help impart 'on- the-job' skills. Research done by World Bank suggests that 69 per cent job threats are due to automation such as machine learning and artificial intelligence[28] .
Role of the government: From provider to facilitator[29]	The Government of India has recognised the role of technology in education via schemes and policies such as Revitalising Infrastructure and Systems in Education (RISE), ICT@Schools, Digital India and National Optical Fibre Network.

Ed-tech industry is expected to witness further transformation driven by:

Infrastructure	In the Budget 2018, RISE has received an investment of USD15.37 billion.
Digital India	Allocation of budget for Digital India has been doubled to USD0.4 billion in FY18-19 from USD0.2 billion the previous year.
Skill development	To impart skill training, 306 Pradhan Mantri Kaushal Kendras have been established

For effective integration, key focus areas for the government are:
- Holistic approach focussing on providing appropriate and reliable access to infrastructure
- Pedagogically sound digital resources for students and teachers
- Capacity building programmes to enable teachers to use ICT as well as remodelling teacher education using technology
- Data systems for improved governance.

26. Online education in India, a study by KPMG in India and Google, May 2017.
27. India can provide higher education to 40 million students by 2020 through foreign collaboration, Indian Express, 26 December 2017.
28. Going, Going, Gone: Automation can lead to unprecedented job cuts in India, Business Today,18 June 2017.
29. Education, POV, KPMG, 1 February 2018.

Transforming towards an open digital economy

Over the past few years, India has essayed several guidelines and reforms such as granting multiple licences for differentiated banking to small finance banks, payment banks and introduced the unified payment interface to include the unbanked population of India in the formal financial services folder, strengthening the payments ecosystem. An upsurge is evident as a result of these reforms and initiatives across several key indicators. Around 878 million bank accounts have been linked with Aadhaar till March 2018[30]. Aadhaar is a biometric digital identity for more than 1.2 billion Indians. Transaction volume using Unified Payments Interface grew from 0.1 million in October 2016 to 312 million in August 2018 and transactions in value terms rose from INR0.5 million to over INR542 billion during the same period[31].

For open digital economy to thrive, strong government support is critical. To propel India towards a digital economy, the government along with the support of regulators, is working aggressively towards creating a progressive digital ecosystem. The government is expediting the move towards a 'presence, paper, and cash – less service delivery' system popularly known as India Stack .The end goal of the relentless efforts put in by the government is not only to open basic bank accounts for fostering financial inclusion, but to also manage the inflow and outflow of funds in accounts. This is done by transferring the direct benefit subsidies with the Jan Dhan Yojna accounts, and then crediting various subsidy (LPG, fertiliser, day wages and so on) directly into the bank account. This inflow of cash into accounts could encourage the unbanked population into adopting formal banking practices.

Evolving the digital future to sustain the transformation

The digital age is likely to fuel more innovative and value-driven business models among start-ups. Last, but not the least, India has been witnessing a rush of innovation across segments, primarily driven by increased availability and affordability of underlying resources driven by technology. We are fast moving beyond e-commerce towards innovative and value driven business models in industries such as biotech, home appliances, medical devices, logistics and entertainment. Fuelled by digital technologies such as machine learning, robotics, blockchain, AI, IoT, and big data analytics for a connected ecosystem and citizen-centric services, egovernance can evolve. As we move into 2020s, most of the foundational and infrastructural initiatives pertaining to Digital India are likely to have come to a full circle. Aadhaar, along with GST and IndiaStack, will potentially form the key underlying connective base across all major platforms ecosystem and it may become an essential element in making India digital savvy. In the near future we may see more promising start-ups coming up with digitally driven products and services beyond 2020. In the short term, productivity unlocked by this digital economy could create 60 to 65 million jobs by 2025. Retraining and redeployment will be essential to help some 40 to 45 million workers whose jobs could be displaced or transformed[32].

In this endeavour, all stakeholders need to give in their maximum to help ensure India achieves its digital potential. Stakeholders will need to anticipate the digital forces that can disrupt their businesses and invest in building capabilities, cooperating with universities and investing in R&D and acquiring talent to deliver digital projects. Governments will need to invest in digital infrastructure and public data that organisations can leverage introduce strong security and privacy laws. As India moves forward, all the culmination of digital transformation may develop into a more interconnected ecosystem that can transform to enhanced value delivery. It is important that we as a society embrace this. Speed is essential and we can derive the full potential of this transformation only if we collaborate together and build silos where the physical and the digital converge and where digital inclusion becomes a basic essential element of our society, and technology takes the lead of this transformative journey.

30. economictimes.indiatimes.com/news/politics-and-nation/16-65-crore-pan-87-79-crore-bank-accounts-linked-to-aadhaar-government/articleshow/63233043.cms
31. economictimes.indiatimes.com/small-biz/startups/newsbuzz/a-new-milestone-upi-tops-300-million-monthly-transactions/articleshow/65651403.cms?from=mdr
32. www.financialexpress.com/opinion/digital-india-march-of-digitisation-will-create-65-million-jobs/1538432/

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