

Harnessing Digital Technologies for Empowering India

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Looking at the five sectors, namely, agriculture, manufacturing, education, health cares and government services, it is obvious that the application of the new digital technologies is going to transform these sectors. The inefficiencies and shortcomings in these sectors can be overcome by application of technology

On July 1, 2015, the Indian Prime Minister inaugurated the Digital India week. Digital technologies or Digitalization, the latest wave of innovation that is connecting people, products and services, is a result of converging of the Information Technology, telecommunication, internet and other related technologies. This is a part of the technological revolution, which is currently in operation. The article aims at examining the role of modern digitalization technologies in solving socio-economic problems of India, focusing on the question: Is it likely to help in providing inclusive growth to people of India and thereby bring in the desired social change?

Socio-economic Challenges, Inclusive Growth and the New Technology Adoption

India faces several socio-economic and environmental challenges. It has the largest number of poor people in the world. A large number of Indian children still suffer from malnutrition. If we consider the cases of many diseases like tuberculosis, cancer and diabetes, we will find that India leads all other nations. Though over a period of time, we have improved our literacy rate, still the number of

illiterates in India is huge. A large number of youths are without jobs. This particular problem is going to increase in the coming years. On top of this, integration with the global economy has further aggravated the problems of marginalised sections of society. Figure 1 has demonstrated the socio-economic challenges India is facing.

As can be imagined, the solutions to these problems are not straight forward. Also, many of these problems are linked with one another. For instance, the problems of poverty, inclusive growth, food security and job creation are linked with our agricultural and agri ecosystem. The solutions require reforms in agriculture and its whole ecosystem. This needs a comprehensive policy framework that would simultaneously impact and address these inter-related problems. Digital technologies have brought about a big change in the governance system at the firm, industry, city and economy. These technologies have further facilitated the implementation of government schemes and programmes. Summing up, it can be said that the present socio-economic challenges before the country can be solved with the help of good governance that focuses on appropriate public policies, programs and scheme and on use of modern technologies, to deliver these

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schemes and programs. All this will result in an all round inclusive growth of the country.

Modern Technologies and India's Inclusive Growth

Keeping in mind the socio-economic characteristics of India, the country needs specific types of technologies to achieve inclusive growth. Mckinsey Global Institute has identified 12 disruptive technologies for India that have the potential for rapid adoption within a set time frame¹.

There are twelve empowering technologies for India that can be categorized into three types: (i) technologies that "digitise" life and work, (ii) smart physical systems, and (iii) technologies for rethinking energy (See table 1). Here, four technologies have particular relevance in Indian context: technologies of digital payments, verifiable digital identity, intelligent transportation and distribution, and advanced GIS. All the four technologies are likely to reach rapid adoption in the coming decade. A few other technologies—advanced robotics, autonomous vehicles, 3D printing, and advanced materials—are also potentially important for India.

The 12 empowering technologies for India have the potential to create both economic and social value that can help India achieve its goals of rapid economic growth, greater social inclusion, and better governance by 2025.

Digital India: An Attempt to Exploit Technology

Digital India Program started by the Government of India is an attempt to use technology for the benefit of people in order to overcome some of the challenges facing the country. The program charts a roadmap to a digital India where a digitally literate population can leverage technology for endless possibilities. Our political leaders have made it clear that the broadband highways are as important as national highways and that while the end goal is to offer better services, foster innovation and generate more jobs. The critical enabler is going to be the technology and the foundation to a digital nation will be the laying of a pan India network.

The Digital India Program is providing digital infrastructure as a utility to every individual, delivering governance and services on demand and enabling the digital empowerment of citizens. The project has identified nine pillars for growth. One key area in the focus of the government is the development of broadband highways that will cover 250,000 Gram Panchayats by December 2016. There will be a greater focus on increasing the broadband penetration in urban areas through the deployment of mandated communication infrastructure in new buildings. Broadband penetration will allow technology-enabled services to be rolled out to the remote parts of the country. The government is

also focused on providing universal access to mobile connectivity. By 2018, more than 40,000 villages are likely to be under the banner of mobile technology.

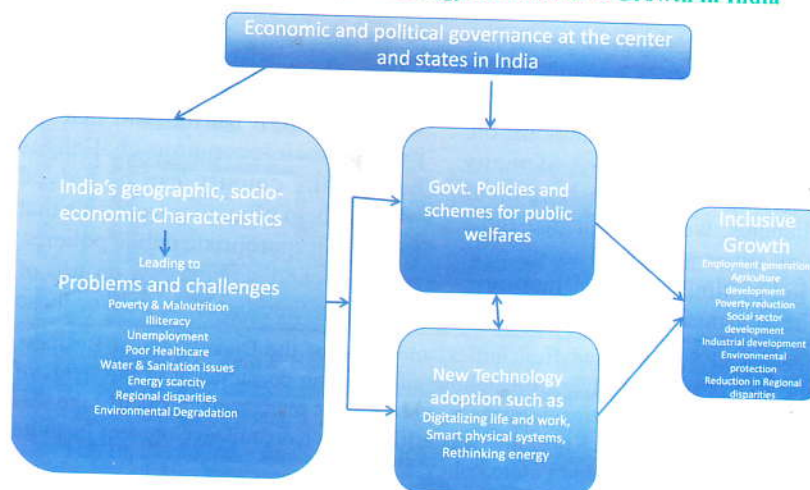
In a nutshell, digitalization is a new wave of innovation and can be compared with the innovation in the form of mechanization and electricity in the 19th century. The technological development are evolutionary, however, its impact on change in society is revolutionary.

Agriculture and Rural Development

Understanding of Indian agriculture and its agro-ecosystem is very important for examining the issues of India's poverty, inclusive growth and food security problems. The real solution to these problems requires, first of all, that we not just develop a single model, but should consider several innovative models depending on the resources available in the region, in order to alleviate poverty, provide decent livelihoods and extend true food security to the people of that region. In the past, Indian agricultural policy largely focused on grains for food security concerns². It failed to notice that there was high inflation in the case of high-value agricultural products. People are also not getting food with enough high nutrition. The high value products, unlike grains, are perishable and require fast-moving supply lines. The whole agro-value chain starting from the farmers, the middlemen, the warehouses to the food processing entrepreneurs, the retailers and the end-consumers needs to be understood holistically to develop the right kind of policy. The addition of the government, other financiers and traders as stakeholders converts the value-chain into an ecosystem. Every stake holder has a role to play and contribution to make to sustain this whole ecosystem. Modern technology can help in making agro-value chain more efficient and competitive.

Mckinsey Global Institute has calculated that hybrid and genetically modified crops, precision farming

Figure 1: Governance, Technology and Inclusive Growth in India



(using sensors and GIS-based soil, weather, and water data to guide farming decisions), and mobile Internet-based farm extension and market information services can help create more than half the \$45 billion to \$80 billion per year in additional value the sector could realize in 2025. The remainder would come from improvements to storage and distribution systems, which could cut post-harvest losses and reforms to the public distribution system to reduce leakage, together saving as much as \$32 million per year in 2025. These improvements could raise the income of as many as 100 million farmers and bring better nutrition to 300 million to 400 million consumers.

Use of technology can be very effective even in providing crop insurance to farmers. Assessing crop damage through all-weather stations, satellite/drone imagery and mobile-based transfers, on the top of crop-cutting experiments, can put the whole system on sound scientific ground and control corruption³.

Digital India platform also intends

to empower the rural citizens through a variety of services. While the government is keen to cover large sections of the population for these services through the digital platform in areas such as improved governance, land records, jobs, health, education and agriculture and digitization of personal and public records for safekeeping, there would be innumerable avenues for budding entrepreneurs as well as existing business to service the rural markets as never before.

Manufacturing Ecosystem

Different economists and institutions have estimated that in the next 5 years, a large number of youth, both boys and girls, shall be joining the workforce. This necessitates India to look closely at the manufacturing sector and its ecosystem. The global manufacturing system is moving away from the earlier model consisting of one company and its various suppliers, financiers and consumers to a model consisting of a manufacturing ecosystem. Digitalisation has empowered this transition. Indian companies and

policy makers need to learn it fast to be competitive in the market and for creating more jobs for the youth. The modern technologies can help here and it is found that Indian companies are fast adopting the technology.

Today's changed digitalized business environment demands a change in the way companies operate. The value chain is being broken, re-assembled and re-invented in all industries. New sources of value creation - by breaking existing value chains, creating new value chains by using other sources of value and by joining value chains of other industries - is becoming important.

In this context, the government policy should be designed to promote the whole manufacturing ecosystem that will result in higher job creation and make our industries globally competitive. Special attention needs to be given to small and medium enterprises and their linkages with large scale enterprises. The promotion of the manufacturing ecosystem concept will help in identifying the gaps in the

Table 1: Twelve technologies empowering India

Digitizing Life and Work	Mobile Internet	Inexpensive and increasingly capable mobile devices and internet connectivity enable services to reach individuals and enterprises anywhere
	Cloud Technology	Computing capacity, storage, and application delivered as a service over a network or the Internet, often at substantially lower cost
	Automation of knowledge work	Intelligent software for unstructured analysis, capable of language interpretation and judgment-based tasks; potential to improve decision quality
	Digital payments	Widely accepted and reliable electronic payment systems that can bring millions of unbanked Indians out of the cash economy
	Verifiable Digital Identity	Digital identity that can be verified using simple methods, enabling secure delivery of payments and access to government services
Smart physical systems	Internet of things	Networks of low-cost sensors and actuators to manage machines and objects, using continuous data collection and analysis
	Intelligent Transportation and Distribution	Digital services, used in conjunction with the internet of things, to increase efficiency and safety of transportation and distribution systems
	Advanced Geographic information systems (GIS)	Systems that combine location data with other types of data to manage resources and physical activities across geographic spaces
	Next generation genomics	Fast, low-cost gene sequencing and advanced genetic technologies to improve agricultural productivity improving India's energy security
Rethinking energy	Advanced Oil and Gas Exploration and Recovery	Techniques that make extraction of unconventional oil and gas (usually from shale) economical, potentially improving India's energy security
	Renewable Energy	Generation of electricity from renewable sources to reduce harmful climate impact and bring power to remote areas not connected to the grid
	Advanced Energy Storage	Devices or systems of energy storage and management that reduce power outages, variability in supply, and distribution losses.
Source: Noshir Kaka, et. Al., India's technology opportunity: Transforming work, empowering people, Mckinsey Quarterly, Mckinsey global Institute, December 2014		

linkages that need to be addressed and supported. The problems of finance, raw materials, land and linkages with the user markets need to be resolved.

The likely adoption of Goods and Services Tax (GST) in India is going to be very important and helpful to India's business and corporate sector to scale up and to be competitive. This is possible again with the use of modern technology. Moreover, the Digital India program focuses on achieving the government's stated target of net zero imports by giving electronics manufacturing due importance and emphasis that it deserves. This focus will boost India's manufacturing capabilities and transform the nation into a manufacturing hub. As part of the program, the government will focus on cultivating an IT-ready workforce by training people in smaller towns and villages with IT for jobs over the next five years.

Education and Skill Formation

There are huge learning crisis and quality issues in our education system. There are weak school learning outcomes, low employability of workers with higher education, large vocational training gaps etc.,. Digitalization has provided immense opportunity to revitalize India's education system. Innovative digital technologies have created new forms of adaptive and peer learning, increasing access to trainers and mentors, providing useful data in real time. Government of India's initiative 'Digital India' can facilitate such transformation in Indian education system by creating an enabling environment across India. With proper thinking and implementation, new technology can be used to improve student learning, building teachers' and mentors' capacity and providing better governance. There is need to have a coordinated and targeted approach to integrate technology into our vast and complex school system and higher educational institutional network. Such an approach can be built on three pillars:⁴

The *first* important aspect is the creation of instructional tools for individualized student learning. This

involves production of e-content such as digitized textbooks, animations and videos. New technology has been beneficial in creating individual learning paths for students, making learning interactive and fun through gamification. It provides them numerous practice opportunities. In India, we can also build learning tools to address the diversity of languages and state curricula.

The *second* aspect of integrated approach is to develop tech-integrated programmes for competency-linked teacher training. Technology allows for reinventing models of teachers' education by creating competency-linked training programmes. It enables teachers to connect with peers, and receive coaching from experts, remotely. In certain states like Gujarat, Uttarakhand and Maharashtra, there are instances of new technology such as WhatsApp groups being used in order to exchange knowledge and ideas with one another. The Karnataka Open Educational Resources platform is enabling teachers to create digital content. There are different models of such technology-use that includes instructional videos, online coaching and peer support. Blended learning with MOOCs (massive open online courses) can bring high-quality courses to students, and learning simulations can boost hands-on training in nursing and other disciplines.

The *third* use of technology adoption is data collection and analysis for strong governance. With the help of robust Management Information Systems, all educational institutions can record, maintain, track and analyse student-level performance data and use it for institution-wide goals as well as teacher-classroom-specific goals. Kerala, Maharastra, Gujarat and Odisha have taken steps to implement such solutions.

Delivery of Health Care Services

Based on international standards, India has just about half the doctors, nurses, and health-care centers that it needs for its population. Also, existing facilities are not geared to deliver optimal health outcomes. Disruptive

technologies could transform delivery of public health services, extending care through remote health services (delivering expert consultations via the mobile Internet), digital tools that enable health-care workers with modest skills to carry out basic protocols, and low-cost diagnostic devices that work with smartphones. For instance, it is possible to convert the smartphone into an affordable eye test solution. An optic device, NetraG, can be plugged into a smartphone and using software and basic optic technology, one can measure the refractive error of an eye — all at a cost of less than ₹300. For those requiring more than just eye glasses, the patient's data can be shared with remote experts in real time. But this will be possible as and when we become a networked society. Digitization is aimed at improving health care delivery, quality and safety, and also facilitating the measurement of quality and safety metrics.

E-governance

Thus, the declared objective of Digital India is to transform India into a 'digitally empowered society', preparing it for 'knowledge future'. Digital India appears to be an aggregation of all e-governance and connectivity plans and projects of the Central government. For instance, BSNL's rural broadband connectivity project using optical fibre to connect 2,50,000 Gram Panchayats has been brought under the Digital India umbrella and rechristened as Bharat-Net. The basic thought behind e-governance or digital empowerment of citizens is to bring citizens and the government closer by removing layers of red tape, intermediaries and ending corruption or rent seeking.

The e-governance formally began in India in 1986 with the opening of the first computerized railway passenger reservation system in New Delhi. This indigenously designed, developed and executed project was the first demonstration of the ability of computer technology to cut down delays, corruption and inefficiency in delivery of a public service. The computerization of land records under the Bhoomi project in Karnataka is another example of highly successful

e-governance program. These projects have further bloomed with the arrival of internet, broadband and mobile technology, and have served as models of e-governance for other utilities and states.⁵ The economic impact of e-government services would enhance competitiveness and create a positive pro-business environment.

Conclusion

Looking at the five sectors, namely, agriculture, manufacturing, education, health cares and government services, it is obvious that the application of the new digital technologies is going to transform these sectors. The inefficiencies and shortcomings in these sectors can be overcome by application of technology. It will transform Indian agriculture and improve the livelihood and living standards of rural areas. Manufacturing will be more competitive and will increase its scale along with providing more job opportunities. Quality and learning issues in education can be tackled by digital technologies. Healthcare facilities can be made affordable and accessible to remotest corners of the country. Provision of government services can be improved substantially. In brief, technology will help in achieving inclusive growth with substantial economic progress, along with stable governance, inclusive and accessible healthcare, education and citizen services.

In order to achieve the full benefit of the new modern technologies, it is imperative to build physical infrastructure for the digital economy, remove the possible barriers to technology adoption and provide effective policies, regulations, and standards for monitoring and controlling the ill-effects of technology, whether intended or unintended. There is also a need to create a vibrant innovation ecosystem. As India is a multi-lingual country, there is a need to weave multi-lingual capabilities to spread information, knowledge and opportunities. There is also a need to integrate traditional systems into modern systems that will simplify various aspects of governance—be it building an efficient public distribution system, automating work, transforming the urban-rural living environment or delivering better healthcare. It must be mentioned here that in the Western countries, the adoption of digital technologies has improved efficiencies and productivity along with reduction in jobs for people. In India, it is expected that in the medium term, it is going to increase more job opportunities. This critical aspect needs to be paid special attention and with great responsibility.

Endnotes

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