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Digital Economy and Artificial Intelligence in India: Technological Transformation for Inclusive Growth and Sustainable Development

Dr. Kavita R. Kirdak

Associate Professor, S.P.M. Science and Gilani Arts, Commerce College Ghatanji, Dist. Yavatmal

ABSTRACT

India is in the midst of a major economic transformation, fueled by digital technologies, artificial intelligence (AI), digital platforms, and data-driven business models, as well as technology-enabled public services. The advent of the digital economy has revolutionized how enterprises operate, how consumers use services, how governments provide social welfare programmes and how workers access labour markets. Digitalisation has also opened up new avenues for innovation, entrepreneurship, financial inclusion and sustainable economic growth. Meanwhile, technological change also brings challenges associated with the digital divide, job displacement, privacy concerns, cybersecurity, algorithmic bias, digital literacy and access to high-tech. This paper explores how the Digital economy, Artificial Intelligence and Technological transition is influencing India's economic transition. It is especially geared toward four interrelated areas: economic growth, innovation, inclusion and sustainable development. The paper is written in descriptive and analytical style and is secondary data derived from government reports, institutional publications and latest literature. The importance of digital economy in the Indian economy has been growing with the economic value of digital economy in 2022-23 accounting to 11.74% of national income and expected to rise to 13.42% by 2024-25. Drug delivery through digital payment systems like the Unified Payments Interface (UPI) has also increased digital financial involvement. Its wider economic relevance will be determined by their ability to create productive jobs, increase productivity, mitigate regional and socioeconomic disparities, enhance innovativeness and environmental sustainability. The paper suggests a framework of digital infrastructure, human capital, responsible AI, innovation ecosystems, inclusive access, green technologies and effective governance for inclusive and sustainable digital transformation.

Keywords: Digital Economy, Artificial Intelligence, Technological Transformation, Innovation, Inclusive Growth, Sustainable Development, India, Digital India

INTRODUCTION

Now the Indian economy is undergoing a structural change in which digital technologies are increasingly being used in production, consumption, financial services, governance, education, health, and agriculture and entrepreneurship. Access to smartphones, low-cost internet, cloud, digital platforms, AI, big data and digital public infrastructure are accelerating the shift from a mainly physical and transactional economy to an economy powered by digital technologies. The digital economy is NOT just about information technology companies. Digital technologies have become an integral part of traditional industries like banking, retail, manufacturing, transport, agriculture, education and healthcare. The relevance of India's

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experience is significant as the country is witnessing the process of technological transformation alongside its overall development agenda of economic growth, employment generation, poverty alleviation, financial inclusion and sustainable development.

As per the Ministry of Electronics and Information Technology's State of India's Digital Economy Report 2024, India's digital economy was estimated to contribute 11.74% to the national income in 2022-23 and would it is expected to rise to 13.42% by 2024-25. The report also estimated the digital economy to be around ₹28.94 lakh crore in terms of gross value added in 2022-23. The numbers reflect the trend of digitalisation becoming a part of India's economy, not just a new technology. Another critical example is digital payments. India's payment transformation has been identified as a crucial part of payment digitalisation and financial inclusion, making UPI a significant part of the retail payment architecture of India. The data from NPCI also illustrate the massive volume of UPI transactions, with over 20 billion transactions occurring just in August 2025. AI takes this change to another level. AI is no longer in the experimental stage and has become relevant for business decision making, manufacturing, healthcare, educational, finance, and agriculture and public administration applications. The Economic Survey 2025–26 particularly discusses the growth of the AI Ecosystem in India and the significance of application-ready, development-oriented approach to AI.

But technological change doesn't necessarily equal inclusive development. Some jobs could be automated, others new jobs and jobs that complement their role. The Economic Survey has thus brought to light the paradoxical impact of digital technologies on employment: technology can lead to a loss of jobs in certain sectors and to a demand for new jobs and skills. Thus, the digital transition needs to be viewed from a development lens in the context of India. The issue at stake is not only how fast India can leapfrog to new technologies, but how technological capabilities can be transformed to productive growth, innovation, employment, inclusion and environmental sustainability.

OBJECTIVES OF THE STUDY

The paper has the following objectives:

To research study the development of the digital economy in India and its role in the economic transformation.

2. To learn about the influence of AI and new technologies in fostering innovation and productivity.

3. To research the technological change and inclusive economic development relation.

4. To understand the key issues in the digital and AI revolution in India.

5. To propose a blueprint for the inclusive, responsible and sustainable technological shift in India.

RESEARCH METHODOLOGY

This study is descriptive, analytical and secondary data based. Data has been gathered from various sources, such as government reports, official institutional publications and peer-reviewed research studies on the digital economy, artificial intelligence, technological innovation, employment, financial inclusion, sustainable development. The major sources are the Economic Survey of India, Ministry of Electronics and

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Information Technology, Reserve Bank of India, the National Payments Corporation of India and the latest academic research published in peer-reviewed journals.

It is organised on four key aspects of technological shifts:

Digital Economy is an enabler for Innovation, Inclusion and Sustainable Development, which in turn strengthens Economic Growth.

The paper does not try to estimate an econometric independence between AI and GDP. Rather, it generates and presents all the available evidence and formulates a conceptual approach to the understanding of the economic transition in India through technologies.

EVOLUTION OF INDIA'S DIGITAL ECONOMY

India's digital transformation has evolved in various stages, all of which are linked. The initial phase was expansion of telecommunications and Internet connectivity. The latter was the use of smartphones and mobile services. The third was about the emergence of digital public infrastructure, digital payments, online platforms and electronic governance. Artificial intelligence, automation, cloud computing, data analytics and intelligent digital services are more and more part of the current stage.

One of the key features of the digital transformation of India is the infiltration of digital technology in the traditional sectors. The Ministry of Electronics and Information Technology estimates that the digital economy is growing beyond the traditional ICT segment into the digitalisation of traditional industries like banking, financial services and insurance, trade and education. This means that digitalisation should be seen as a transformation of the economy and not as a separate technology sector.

1. Digital Public Infrastructure: Digital public infrastructure, which enables identity, payments, data exchange and service delivery, is key to India's digital transformation. It has eliminated transaction barriers and made it possible for businesses and citizens to engage in digital markets. One of the more prominent examples is UPI. It has facilitated the use of interoperable infrastructure to make instant digital payments for individuals, businesses and small merchants. RBI has emphasised that digital payment system plays a crucial role in enhancing reach and efficiency of financial services. This importance of such infrastructure goes beyond simply payments. It can facilitate formalisation, financial inclusion, digital entrepreneurship, and streamline provision of government benefits.

2. Platform Economy: Digital Platforms are changing the way of doing business. New channels have been established between producers and consumers through the advent of ecommerce, ride-hail, food delivery, online schooling, digital financial services, and professional platforms. The platform economy has also helped to grow flexible working practices. But job through platforms is associated with issues of income insecurity, social security, working conditions and long-term career prospects. India's gig economy is experiencing a significant growth and the commission of the Economic Survey has emphasized the need to have a clear understanding of the evolving dynamics of employment. Thus, authorisation brings about new policy needs and economic opportunities.

ARTIFICIAL INTELLIGENCE AND TECHNOLOGICAL TRANSFORMATION

AI is the next big wave of digital transformation. AI systems have the capability to evaluate significant amounts of data, detect trends, carry out repetitive tasks, create content, assist in decision-making, and

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enhance forecasting. The combination of India's vast domestic market, its rich pool of technical talent, its wide variety of data, and the unique development challenges it faces make AI particularly important for the nation. In the Economic Survey 2025-26, the government has concluded that India's situation is conducive to a development-oriented and application-driven approach to AI, rather than just competition in cutting-edge foundation models. The IndiaAI Mission is an important institutional initiative. Compute capacity, datasets, foundation models, future skills, application development, start-up financing, and safe and trusted AI are all among the pillars in the Mission.

This is significant because you can't just build the technology, you have to have the capability. The AI transformation process calls for an ecosystem of:

- computing infrastructure;
- high-quality datasets;
- skilled human resources;
- research and innovation;
- entrepreneurial capital;
- institutional capacity;
- ethical standards; and
- appropriate regulation.

Therefore, AI should be treated as an ecosystem and not just a single technology.

DIGITAL ECONOMY AND ECONOMIC GROWTH

There are several ways in which digitalisation can be a contributor to the economic growth.

A. Productivity Enhancement: Digital technologies can help lower transaction costs, enhance information flows and automate repetitive tasks. Data analytics enables businesses to gain insights into consumer behavior, optimize their supply chain and inventory management. AI can also enhance productivity in other ways, such as through forecasting, predictive maintenance, fraud detection, customer service and resource allocation.

2. Market Expansion: Small businesses and enterprises can target consumers in other geographical areas through digital platforms. This may be especially crucial for micro, small and medium businesses. Digital commerce also helps producers to join in larger value chains. As a result, some geographical limitations to market access can be mitigated by digitalisation.

3. Formalisation: Digital payments and digital records can be used to facilitate more formalisation of economic activity. Digital transactions generate records that can be used to build enterprise financial history and economic services. This does not mean that digitalisation is the end of the informality, but can establish processes whereby informal businesses and workers can step-by-step become linked to formal systems.

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4. New Economic Activities: Digital transformation generates new industries and jobs, such as Software, Data Science, Cyber Security, Cloud Computing, Digital Marketing, Platform Services and AI related activities. The growing digital economy in India is thus more than just a transition of technology; it's also a shift in the nature of economic activity.

ARTIFICIAL INTELLIGENCE AND INNOVATION

Innovation is the key to India's knowledge economy. AI can enhance innovation by cutting down on the time spent on data analysis, experimentation and product development.

AI-powered tools can aid in:

- scientific research;
- drug discovery;
- agricultural forecasting;
- financial risk assessment;
- industrial automation;
- smart manufacturing;
- language technologies;
- educational technology;
- healthcare diagnostics; and
- climate and environmental monitoring.

Studies have recently been conducted in India, which suggest that appropriate institutional and technological conditions can help bring about green growth through innovation in AI and green technology. An empirical study based on the Indian data of the period 1987 to 2020 has identified positive long-term relationship between AI and green technology innovation and green growth, as well as the ability of AI to improve the contribution of renewable energy and green technology innovation. If technology is directed towards appropriate applications, then technological innovation can play a role in both economic and environmental goals, it would seem. There is also a huge domestic market in India with diverse applications for the development of innovations that can be application specific. Solutions to agriculture, healthcare, education, and transportation and public administration issues must be tailored to local conditions. This provides opportunity for Indian researchers, entrepreneurs and startups to come up with context-specific technologies.

ENHANCING FINANCIAL INCLUSION THROUGH DIGITAL TRANSFORMATION

A key area where India's digital transformation has been most apparent is in financial inclusion. Digital banking, mobile payments and UPI have made financial systems more accessible. Small businesses can take electronic payments without having to have traditional card systems; you can transfer funds using mobile devices.

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According to RBI, India's digital payment revolution is playing a significant role in enhancing the accessibility and reach of payment services.

But using payment is not enough for digital financial inclusion. Individuals also require:

- digital literacy;
- financial literacy;
- reliable connectivity;
- access to smartphones;
- awareness of cybersecurity;
- consumer protection; and

A sense of security and trust within the digital system.

Success, in relation to digital inclusion, must be measured not just by the number of transactions but also if the disadvantaged are able to access digital services safely and meaningfully.

AI AND JOBS (PART 12 OF A 24-PART SERIES)

Employment is one of the most critical aspects of the technological change in India. AI can help automate repetitive cognitive and administrative processes. This raises issues about people being displaced, especially those who have jobs that involve repetitive and codable actions. Meanwhile, technology creates new jobs and jobs. This is characterized as a "displacement effect" and a "reinstatement effect"—automation can lower the need for specific jobs and create jobs for complementary skills and new activities. Therefore, the impact of AI on employment is heavily reliant on education, skill building and how quickly labour markets adapt.

India needs to strengthen:

1. digital literacy;
2. AI literacy;
3. vocational education;
4. reskilling and upskilling;
5. interdisciplinary education;
6. lifelong learning; and
7. industry-academia collaboration.

Collaborative learning, problem-solving and human–AI interaction are crucial for building AI skills in management education, according to recent studies involving students and faculty from Indian universities.

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The goal should be to enable workers to collaborate with AI, and not just compete against it. India's technological transformation has faced some significant hurdles. Some of the challenges faced by India's technological transformation were major.

India has ample opportunities but it has a number of challenges as well.

Vulnerable groups can be left behind by digitalisation due to unequal access to devices, connectivity and digital skills:

1. Digital Divide: Unequal access to devices, connectivity and digital skills can exclude vulnerable populations from the benefits of digitalisation.

2. Job Displacement: Automation and AI could lead to job losses in certain repetitive roles. Those who are not having the opportunity to reskill may be experiencing changes which are difficult to manage.

3. Data Privacy and Cybersecurity: As digital services grow in number, so does the need for protecting personal and financial data.

4. Algorithmic Bias: I systems can replicate biases in the data sets or institutional processes. This can lead to unequal opportunities in work, mortgage, health care and services.

5. Technological Power: Development of advanced AI systems demands significant investments in computing power, data, and specialized expertise. This can focus technological capabilities in a few large companies and countries. This global gathering has been acknowledged in the Economic Survey as a key factor in India's AI strategy.

6. Skill Gaps: As technology evolves quickly, the skills that already exist may become outdated. Therefore, reskilling is a prerequisite for the continuousness.

Electricity, computing and electronic equipment are required for digital infrastructure, which generates environmental costs. These environmental costs need to be resolved in order to achieve sustainable technological development.

CONCLUSION

India's move towards a digital and AI-powered economy is a significant shift in its economic structure. Digital platforms transform markets, governments and households, as well as digital public infrastructure and online services and digital payments, and emerging AI applications are reshaping the way businesses operate. It can be seen from the evidence that the digital economy has already gained a major stake in India's national economy. The digital economy in India was valued at 11.74% of GDP in 2022-23, and is expected to constitute 13.05% of the GDP by 2024-25. The volume of digital payments also reflects how much technology has become a part of our daily economic life. AI is the next step in this evolution. The real issue for India is not just to embrace AI but integrate its use to make it productive, innovative, job creating and socially valuable. The India AI Mission and the vision for development as stated in the Economic Survey 2025-26 emphasize the need to develop the capacity of the country in computing, datasets, skills, applications and responsible AI. Technological advances are not sufficient for inclusive or sustainable development. Digital exclusion, job displacement, privacy concerns, algorithmic bias, cyber security risks, and environmental impacts need to be tackled in tandem. It is therefore necessary to have a wider

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development principle to shape the future of India's digital economy: Technology must be used for enhancing economic and social welfare, but should not be for itself. Digital infrastructure, human capital, innovation and inclusive access with responsible AI governance and green technologies can give a boost to India's long-term technological strategy. This can contribute to linking technological change to the overall conference theme of growth, innovation, inclusion and sustainable development. For India, the key policy question is not whether to embrace digitalisation and artificial intelligence, but how to make technological change inclusive and beneficial to the economy in broad terms, whilst being socially responsible and environmentally sustainable.

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