



Empowering the Last Mile: Inclusive AI for All

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Abstract

The vision of Viksit Bharat 2047 is founded on inclusive growth, where development is deeply enmeshed in equity and social justice. This chapter explores the transformative power that Artificial Intelligence (AI) holds in advancing last-mile inclusion by addressing the fundamental priorities of a Viksit Bharat and by leveraging India's foundational digital public infrastructure and rapid technological prowess; AI can bridge long-standing gaps in access, affordability, and quality. The chapter provides an overview of the problems and examines how AI-driven solutions are being used to address them. Enhancing learning outcomes, supporting children with special needs, and empowering tribal and rural communities through adaptive educational technologies in the education sector. In healthcare, AI is reshaping early diagnosis, maternal and child health services, tuberculosis management, and even water security, reducing inequities in service delivery. In agriculture, AI-powered advisory systems are equipping marginal farmers with knowledge and tools to improve productivity and disaster resilience. For marginalized communities, including transgender persons and other vulnerable groups, AI is providing dignity, toleration, representation, and safety. Further, AI-enabled solutions in finance and disaster risk reduction are bridging finance gaps, strengthening social security, and disaster readiness. This chapter argues that AI is not merely a tool to enhance productivity but a categorical imperative in public policy for achieving an inclusive Viksit Bharat. The discussion highlights the opportunities at hand while underscoring the challenges: Need for responsible governance and people-centric design in harnessing AI for equitable and inclusive growth.

Keywords: Viksit Bharat 2047, Artificial Intelligence, Learning Outcomes, Social Security, People-Centric.

Introduction

Viksit Bharat and Inclusive Growth

Dr. Nirmala Sitharaman, the Finance Minister of India said in her Budget speech for financial year 2025-26 from the floor of Parliament that “A country is its people and soil.” She was echoing the venerated poet Gurajada Appa Rao. The theme for the budget 2025-26 was “sabka vikas” or “inclusive growth.” She identified the priorities of Viksit Bharat (Developed India), which are zero poverty, quality education and healthcare, skilled people, women, and farmers. These are, in fact, people-centric priorities (Press Information Bureau, 2025). Prime Minister of India, Shri Narendra Modi has also repeatedly stressed his government's commitment to benefit all, from his speeches in Parliament to the ramparts of the Red Fort. Thus, their political messaging signals inclusive growth.

Identifying the challenges of development, the World Bank calls for improving the quality of life of people by involving access to quality and affordable healthcare and education, and not just higher income levels. Thus, economic growth, when inclusive, takes the form of development; the idea of Viksit Bharat is based on inclusive growth and not growth alone (World Bank, 2025).

The industrial revolution that emerged from the age of heightened intellectual curiosity in the 18th century in England and Europe brought prosperity but was not free from glaring inequalities. Today we live in the era of the 4th industrial revolution and on the cusp of industry 5.0 when, according to the technology convergence report, “Multiple foundational technologies are maturing simultaneously.” (World Economic Forum, 2025). Envisioning a future society without inequalities remains an egalitarian dream without utilizing and building on the advances of our times, such as artificial intelligence.

Artificial Intelligence: A Tool for Inclusive Development

According to NITI Aayog, AI includes technologies that enable machines to function with human-like intelligence capabilities, including sense perception. AI is not a new phenomenon. Its foundations date back to the 1950s, but due to increasing computing power and advancements in data storage, we are now able to see the true potential of AI (NITI Aayog, 2018). From predicting structures of proteins using AlphaFold to GNoME identifying new crystal structures, today AI is such a powerful tool that in 2024, Nobel Prize in Physics was awarded for laying the foundations of machine learning (ML) on using tools from Physics (Nobel Prize Outreach, 2024). AI today has the potential to democratize technology.

The world looks at AI with curiosity, waiting for real applications; Nandan Nilekani sees the potential today in India. He mentions, with over 790 million mobile broadband users in India, an expanding segment of the population that can utilize AI services is being created with cheaper data plans rolling out, increasing internet

penetration, and India's solid footing in digital public infrastructure like UPI and Aadhaar enables it to lead the charge in AI adoption. Therefore, Viksit Bharat must be founded on AI (Nilekani & Bhojwani, 2023).

The Role of the State and Social Justice

In every society, there is a fundamental problem of social organization. How should the benefits and burdens arising out of a social organization be distributed? The role of the state today is not limited to a nightwatchman state, but to a state that is a service state ensuring that conditions for the socio-economic development of its people are actively created. In simple terms, it is turning into a welfare state. In a society, there may be certain disadvantaged groups who due to historical injustice, socio-economic conditions, physical and mental capacities, etc., may be outdone by others and are kept out of the mainstream development. This was seen during the Great Depression. Thus, a modern welfare state emerged at the time when social security was at peril. The state should benefit all; this was the thinking (Gaubha, O. P., 2022).

This is consistent with John Rawls' theory of justice, where rational debaters in the veil of ignorance tolerate inequalities that benefit the worst off. A state bridging the disparities in income, health, and education is both tolerated and appreciated (Rawls, J., 1999). AI is, therefore, not just a tool to boost productivity but a moral necessity to connect to previously disconnected areas and people. This chapter explores how AI is being leveraged to achieve that vision.

Artificial Intelligence can be applied across the various pillars of Viksit Bharat, while simultaneously empowering marginalized sections of society (Press Information Bureau, 2025). The Ministry of Social Justice identifies the following marginalized groups as target groups: Scheduled Castes, Other Backward Classes, senior citizens, victims of substance abuse, denotified, nomadic, and semi-nomadic tribes, beggars, transgender persons, manual scavengers, sewer and septic tank workers, and waste pickers (Department of Social Justice & Empowerment, n.d.).

Education

- **Foundational Role of Education**

Education is the bedrock of India's march toward Viksit Bharat 2047 based on equity, growth, and inclusion. The World Bank identifies education as foundation to escape the vicious circle of poverty and enter a virtuous cycle of development. Education improves health, gender equality, peace, and stability, and ensures equity and inclusion (The World Bank Group, 2025). The Sustainable Development Goal 4 talks about inclusive and equitable quality education, providing lifelong opportunities. With the use of AI, India is making long strides in progress in education (United Nations, Department of Economic and Social Affairs, n.d.).

- **AI in Workforce Development**

In India, a skilled workforce remains a challenge, with only 42.6% of Indian graduates being employable. (India's Graduate Skill Index 2025, 2025). Companies now look for quick adaptability in graduates to change according to changing environments while emphasizing technical skills. In light of this, Google has developed AI Essentials. The self-paced course on AI that takes less than 10 hours teaches about the use of generative AI tools to boost productivity, with users reporting an average of 1.75 hours saved daily. Google aims to empower 10 million people, including students and job seekers, to build an AI-ready Indian workforce. (Google, n.d).

- **AI in Primary, Tribal, and Special Needs Education**

Training the workforce is only one side of the problem. Reducing children drop outs from educational institutions is equally important. According to the Ministry of Education's Unified District Information System for Education (UDISE) Plus data, there has been a decline in the enrollment of students in classes 1-12 between 2022-23 and 2023-24 by 3.7 million. (Ministry of Education, Government of India, 2024). A major reason for students dropping out is the shortage of teachers. Over 110,000 schools in India, have only one teacher, making it difficult to provide proper education (India Today, 2019). AI is being deployed to fill in these gaps. A trial found that AI boosted learning in children by twice (Dixit, S. and Gill, I. S., 2024). According to the Poverty Action Lab 2019, scientific evidence suggests improved learning outcomes using AI in many underdeveloped countries (Poverty Action Lab, 2019).

While AI is equipping the workforce of tomorrow, it is also promising primary education. Professor Idiom is an AI chatbot developed by IBM that helps students learn English language (Bhatia, 2021). The Bhashini platform by the Ministry of Electronics and Information Technology facilitates translation across Indian languages using AI, to promote social inclusion (Raizada, 2025). Mindspark, an AI-driven application, provides a personalized learning experience for students, improving critical thinking capabilities. The application is available in nine Indian languages and is used by over 500,000 students (USAID (United States Agency for International Development), 2021).

Providing education to children with special needs is another challenge. A study estimated the median annual cost to families of children with Specific Learning Disabilities (SLD) as almost half of India's per capita income in 2020–21. (Panda, P. K.; Ramachandran, A.; Bhadoria, A. S.; Sharawat, I. K., 2025). According to a study published in the Indian Journal of Pediatrics, in 2021, 1 in 68 children in India is affected by autism (Chattopadhyay, N., 2024). To cater to their educational needs, Cogniable has developed a cost-effective solution, offering assessments and assistance to children diagnosed with autism and providing high-end education to children with special needs. Cogniable has conducted over 340,000 sessions and enrolled over 4,500 parents (Ministry of Electronics and Information Technology, n.d.).

Beyond special needs education, geography itself becomes a hurdle. Providing quality education to far-flung areas situated in challenging locations, areas afflicted with conflict and anxiety, poses a challenge in the realization of SDG 4. (United Nations, Department of Economic and Social Affairs, n.d.). The All-India Council for Technical Education (AICTE), in partnership with Embibe, an EdTech company that offers AI-powered solutions, is delivering outcome-based learning, impacting the lives of more than 350,000 tribal students and using technology to empower teachers. (FE Education, 2023).

- **AI for the Transgender Community and Digital Safety**

The transgender community also faces discrimination based on their gender identity. According to the National Human Rights Commission (NHRC), in 2018 over 96% of India's transgender persons were denied jobs despite having the necessary qualifications. (NHRC, 2017). As per the 2011 census, there are 480,000 transgender persons in India; however, for most of them, life is unrewarding due to the stigma and discrimination that they face (Avasthi, 2025). Shhor AI, a content moderation application programming interface (API), strives to build a harmonious online space for all. 'Shh the hate, amplify love,' says Aindriya Barua, the UN-award-winning anti-hate speech solution's creator, essentially creating a more tolerant social media for transgender people, LGBTQIA++, etc. (Deshkar, A., 2024).

With AI, new possibilities for empowering the marginalized have arisen. From upskilling for employability, delivering basic education to the last mile, AI underscores a new way forward in the realization of Viksit Bharat. With such initiatives, the journey to a Viksit Bharat feels more fulfilling.

Farming

- **Role and Problems of Agriculture**

Agriculture constitutes a major sector of the Indian economy and its workforce. Agriculture and allied sectors account for 18.8% of India's Gross Value Added at current prices during 2021-22 (Press Information Bureau, 2022). According to 2023-24 Periodic Labour Force Survey (PLFS), about 46% of workers were engaged in the agriculture sector (TOI News Desk, 2024).

Indian agriculture suffers from inefficiency, which can be improved, among others, by using advisory and extension services. However, the ratio of extension service providers to farmers is skewed in India, with only 6% to 16% of farmers receiving advice from an extension agent in 2013 (Cole, S., 2017). Moreover, they are difficult to reach in remote areas.

- **AI in Agricultural Extension Services**

Small and marginal farmers in India require knowledge on when to sow, irrigate, apply the pesticide, harvest the crop and so on. Talking about pesticide

usage, applying pesticide too early and too late would yield pest infestation. In 2019, pink bollworms caused losses of 20 percent to 30 percent of the cotton crop in Maharashtra. CottonAce, an AI-based application, provides expert advice related to agriculture, in several languages to farmers in India. In Karnataka, using CottonAce lead to almost a 1.25 times revenue increase (Elbehri, A., & Chestnov, R., 2021).

Agrostar, using Google Cloud, launched an application that is helping over a million small farmers in India boost crop yields, income, and raise the standard of living in rural areas. A 2018 survey showed that 70 percent of small farmers expressed a lack of adequate farming-related information, resulting in crops being damaged by unforeseen weather and pests. Such small farmers rely on traditional methods of cultivation and lack access to new quality seeds and soil analysis. Using Agrostar, they can learn effective farming practices, receive tailored knowledge from experts about their soil and crops, follow market trends to forecast crop prices, and shop for high-end farm tools and fertilizers (Google Cloud, n.d.). The Punjab Agri Export Corporation uses AI to certify quality seed using QR codes that enable the buyer to find the origins, quality, and certification of seed potatoes (Ministry of Electronics and Information Technology, n.d.). This is important for potato cultivators in Punjab who produced 32.38 lakh metric tonnes of potatoes during 2023-24 (Punjab Agricultural University, n.d.).

Health

- **Importance of Health in Development**

According to the World Bank, investing in a skilled, healthy workforce and infrastructure leads to economic growth, job creation, and security. Yet rural India still suffers from a lack of adequate health infrastructure, both in terms of skilled technicians and facilities, which causes loss of productivity for the diseased and excessive out-of-pocket expenditure, pushing families into financial strain (Kasthuri, A., 2018). Despite significant progress over the past few decades, in 2018, India ranked 145th out of 195 countries in the healthcare access and quality (HAQ) index, behind neighboring and smaller countries like Sri Lanka and Bangladesh. This shows the challenges rural India faces (Fullman, N., et al., 2018). We explore how AI is being used to fill these gaps.

- **AI for TB Mukht Bharat**

Tuberculosis (TB) is one such infectious disease caused by bacteria that most often affect the lungs, spreading through coughing, sneezing, etc. India used to be one of the most TB-affected countries. According to WHO estimates, around 2.7 million people had TB in India, and over 400,000 people died in 2017 because of TB (Dhamnetiya, D., Patel, P., Jha, R. P., Shri, N., Singh, M., & Bhattacharyya, K., 2021). One of the reasons for deaths is that patients fail to actively follow up. To save lives, it is imperative to prevent loss to follow-up (LTFU). In response to this challenge,

Wadhwani AI has developed an AI solution that effectively predicts the risk of LTFU and mortality. Wadhwani AI aims to provide targeted TB treatment to around 12,000 patients. It will help in the efforts to make the country TB-free by 2025, five years ahead of the SDG 3.3 deadline of 2030 (ETHealthWorld, 2023).

- **AI to Benefit Children's and Women's Health**

A key indicator of the health of a country is the infant mortality rate (IMR). In 2021, the IMR stood at 27 (per 1,000 live births) for India. For comparison, the IMR in East Asia and Pacific economies (excluding high-income countries) was 13 for the same period (World Bank, n.d.) ; one of the reasons for the high IMR, despite the prevalence of primary healthcare centres in rural areas, is the lack of adequate equipment. According to Doherty and Kinney (2019), due to defunct equipment and babies being born outside of health centres, approximately 48% of birth weights go unrecorded (Doherty, T., & Kinney, M., 2019). Wadhwani AI is building a smartphone application that can accurately record a baby's physical characteristics like body weight, height, etc., helping improve delivery services in primary healthcare centres and further reduce mortality rates of infants in India in particular and rural areas. ARMMAN, a non-profit organization, uses personalized voice messages to deliver information to underserved expecting mothers. The program is called Mitra. Mothers who follow these specially curated instructions based on their gestational age show a 36% increase in knowing the importance of iron tablets, which is a positive sign. These examples show how AI-driven solutions are beginning to address challenges in healthcare (Dixit, S. and Gill, I. S., 2024).

The health of women and girls is of particular concern because, in many societies, discrimination against women is deeply entrenched. Today, breast cancer is the leading cause of cancer deaths in women. 1 in every 12 women has the risk of a breast abnormality (WHO, Breast Cancer , n.d.). Non-Invasive Risk Assessment with Machine Intelligence (NIRAMAI) Health Analytix, a deep tech startup, has developed software to detect breast cancer at a much earlier stage using machine intelligence over thermography images. It is cost-saving, effective, and easily deployable in primary clinics to reach underserved areas (Ministry of Electronics and Information Technology, n.d.).

- **AI for Vision**

Vision loss deters individuals' health, productivity, and financial well-being. Nearly 45% of patients in India, suffer vision loss before diagnosis due to the lack of availability of eye specialists (Shukla, R., Gudlavalleti, M. V. S., Bandyopadhyay, S., Anchala, R., Gudlavalleti, A. S. V., Jotheeswaran, A. T., Ramachandra, S. S., & Singh, V., 2016). To address this challenge, Google has partnered with Aravind Eye Hospital in Madurai and Sankara Eye Hospital in Chennai to launch AI for Retinal Screening. People who can't come to hospitals get their retinas captured by nurses at

local centers to be uploaded to Google's cloud service. Using ML and specialists, the disease is detected (Mint, 2017). Similarly, Tamil Nadu e-Governance Agency (TNeGA) has developed an AI application for mobile known as ePaarvai to enhance productivity in screening cataract patients. By simply clicking a picture, the app can be used for the preliminary screening of the eye. These AI-driven solutions demonstrate how technology expands reach to quality eye care in underserved areas (Ministry of Electronics and Information Technology, n.d.).

- **AI for Water**

With only 4% of the world's water resources, India shoulders its 18% of the global population making it one of the most water-stressed countries in the world. The Jal Jeevan Mission (JJM) aims to give piped water connections to every household in India. With the help of Tata, a successful demonstration was carried out to introduce IoT devices to monitor the implementation of the scheme in areas of extreme climates (-10°C to 48°C). The project helped in the identification of problems in distribution, including leakages and outages (Ministry of Electronics and Information Technology, n.d.). Achieving JJM's goals will save over 5.5 crore hours daily, primarily for women, otherwise spent on collecting water (Ministry of Jal Shakti, 2025).

However, the problem is not limited to the distribution of water. According to WHO, prolonged intake of arsenic-contaminated water can lead to arsenic poisoning, bladder and kidney diseases. In India, the states of West Bengal, Jharkhand, Bihar, among others are most affected by arsenic contamination of groundwater (WHO, Arsenic-India, n.d.). Researchers from IIT Kharagpur, using AI algorithms, have predicted the distribution of groundwater arsenic and human health risks in the affected areas. These initiatives illustrate the transformative potential of AI and technology in addressing critical health challenges across India, particularly in rural and underserved areas (Ministry of Electronics and Information Technology, n.d.).

Finance

- **MSMEs and the Need for Financing**

In 2024, Micro small and medium enterprises (MSMEs) in India contributed 30% of GDP, over 40% of exports, and employed over 110 million people (IFC, 2024). Yet, 92 percent of MSMEs lacked access to formal finance before the COVID-19 pandemic (Dixit, 2023), widening the \$230 billion finance gap (World Bank, n.d.). The reason is a lack of financial identity. Using AI 80% of India's population can access formal credit by assessing their creditworthiness in the absence of traditional sources, further formalizing credit accessibility by customizing loans based on individual needs. Aye Finance utilizes AI tools to evaluate the creditworthiness of an individual based on metrics like shopping (Dixit, S. and Gill, I. S., 2024).

By enabling credit to these enterprises, primarily run by individuals in semi-urban and rural areas, AI is helping strengthen local economies, build livelihoods at

the grassroots level, and promote last-mile inclusion. Branch is a financial technology company that tailors loans according to borrowers' demands. Tala is another such company that allows users to borrow amounts ranging from \$10 to \$500 (Dixit, S. and Gill, I. S., 2024).

- **AI for Social Security**

Getting the annual life certificate is a tedious task for pensioners, as they have to travel long distances to government offices to establish identity and liveness. Telangana government innovated an app-based authentication system where the beneficiaries have to take a photo and upload it. Using AI, ML, and deep learning, the solution cleverly authenticates 93% of the pensioners successfully. Andhra Pradesh government has announced the introduction of an AI-based beneficiary identification system, to help over 61 lakh people from poor and vulnerable groups. The traditional system was defected due to smudged thumb impressions and non-uniform pensions, leading to the misappropriation of funds (Ministry of Electronics and Information Technology, n.d.).

From enabling first-time borrowers to receive formal credit to simplifying life certificate authentication and pension disbursement, AI is proving to be a versatile tool for improving last-mile access to financial and social services.

Disaster

- **Floods and Droughts**

Disaster refers to a serious disruption in the functioning of a community. Some population groups are more vulnerable to disasters based on their age, gender, disability, socio-economic status, geographical location, or migration status (UNDRR, n.d.).

With 44% of its population exposed to flood risks, India is the most flood-prone nation in Asia. In response, Google developed AI program to provide accurate forecasts up to 48 hours in advance, ensuring vulnerable communities receive timely alerts (Matias, 2024). Google is also building an Agricultural Landscape Understanding (ALU) using satellite data to construct irrigation structures like wells and ponds for drought preparedness. This ensures that vulnerable farmers and communities are better prepared for water scarcity (Google team, 2024).

- **The COVID-19 Pandemic**

The COVID-19 pandemic challenged healthcare systems around the world, making communication and information important to prevent the virus from spreading and reducing deaths. In this emergency situation, AI powered MyGov Corona Helpdesk, was built in a matter of 5 days. Since its launch, the helpdesk has catered to over 240 million user messages. MyGov with Accenture and Microsoft developed an AI virtual assistant called MyGov Saathi that was tuned to provide customized answers for queries relevant to farmers, migrants, senior citizens, frontline workers,

and other citizens alike, so they all adopt COVID-appropriate behaviors that minimize transmission. DRDO developed ATMAN AI, an AI-based COVID detection application using chest X-rays to detect COVID-induced lung abnormalities (Ministry of Electronics and Information Technology, n.d.).

Providing medicines and other healthcare items in remote rural areas was another challenge. To counter this, Telangana government launched the 'Medicine from the Sky' initiative to enable emergency medical deliveries, and to integrate drone deliveries and upgrade rural healthcare infrastructure to the urban level. (Ministry of Electronics and Information Technology, n.d.)

Conclusion

This study describes how AI is significantly enhancing the efficiency and effectiveness of services by reaching the last mile, bridging challenges of growth and gaps in the development process. The potential AI holds today goes beyond enhancing productivity to effectively realize social justice. By democratizing technology and capitalizing on its vast Digital Public Infrastructure (DPI) and internet penetration, India is marching towards a Viksit Bharat, addressing persistent challenges in sectors like education, healthcare, finance, and target groups like farmers, women, infants, and the elderly, building strong foundations for a developed state.

India is using AI to address challenges in agriculture to combat pest infestation, irrigation, extreme weather, and to help farmers. In healthcare, it is promoting accessibility and affordability through diagnostic and detection solutions and the dissemination of information. It is promoting credit inclusion for small borrowers. In education, it aims to empower underserved students, deliver personalized learning, and boost the skill set of the workforce. AI today is bringing progress and harmony together.

However, the promise of AI should not be seen as a panacea. Safeguards against bias and privacy infringement are essential for AI to bring significant improvements in service delivery and effective last-mile inclusion. Data security, governance, and AI ethics must be prioritized; if implemented properly, India's development story will truly reflect the AI-for-All philosophy.

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