

Digital Literacy for Sustainable Development Cutting-Edge Technology of Viksit Bharat 2047

Dr. Awahesh Singh Gautam,

Head of Department,

Department of Library and Information Science,

Gopal Narayan Singh University, Jamuhar, Sasaram,

Rohtas, Bihar-821305.

Abstract

India holds a crucial place in the worldwide leadership of sustainable development since it is the largest democracy in the world and has one of the nations with the greatest economic growth. With innovation, inclusivity, and sustainability at its core, Viksit Bharat @2047 symbolizes India's ambition to become a fully developed country by the century of its independence. Emerging technologies are increasing productivity, boosting global competitiveness, and spurring innovation in various industries. By providing tailored financial assistance & investment suggestions, artificial intelligence-powered chatbots & robo-advisors are democratizing the provision of financial planning services. Decentralized finance (DeFi) systems and other blockchain-based solutions are simplifying trade finance procedures, lowering operating costs, and facilitating safe and transparent cross-border transactions. This chapter examines how innovation and technology are essential to achieving this lofty goal. It provides a thorough examination of India's contemporary digital infrastructure, the country's ascent in international innovation rankings, & the use of cutting-edge technologies including biotechnology, renewable energy, artificial intelligence, and space research. The story highlights government programs such as Start-up India, Digital India, and the National AI & Green Hydrogen Missions. Furthermore, the story underscores the importance of inclusive growth, which encompasses youth empowerment, women-led innovation, and rural digitization. Alongside strategic advice, issues like cybersecurity concerns, low investment in research and growth, and the digital divide are also discussed. India is positioned to emerge as a worldwide leader in technology, not simply a consumer, by cultivating a strong innovation ecosystem and utilizing partnerships between university, industry, and the private sector. This chapter provides a comprehensive plan for a tech-powered, inclusive, and sustainable Viksit Bharat before 2047. Higher education is one of the areas that must use developing technology, especially artificial intelligence (AI), to achieve Viksit Bharat 2047 (the Developed India 2047). Outside of higher education, artificial intelligence influences technology and economic progress. Young minds will realize this transformative vision as soon as they actively interact with AI. AI literacy empowers students in higher education to investigate, produce, and innovate. Students may do research, find solutions to real-world issues, and alter the course of history as they learn AI.

Keywords: Global Administration, Sustainable Development, Strategy Innovation, Comprehensive Development, India, Viksit Bharat @2047.

INTRODUCTION: The principle of Viksit Bharat @2047 embodies India's long-term developmental goal of becoming a fully developed country before the anniversary of the nation's founding. This vision centers India's growth trajectory on innovation, inclusivity, and sustainable development. India's involvement in the global governance for sustainable development continues to increase in importance in a world that is quickly becoming more interconnected and where problems like inequality and climate change, including sustainable resource management, cut across national borders. In political science, the structure of organizations, standards, and decision-making procedures that support group action on global concerns is referred to as global governance. States must cooperate in the areas of equality for all and the economy, as well as the environment, to meet the Sustainable Development Goals, also known as the SDGs, established by the UN. India holds a special place as one of the biggest democracies in the world, a significant developing economy, and a nation facing numerous developmental obstacles. It is a test case for equitable sustainable growth, a rising force in global institutions, and a representative of the Global South. India has traditionally fought for developing countries' rights in international forums while taking on more leadership roles. India has continuously highlighted equity, justice, & sovereignty ideals in international collaboration, from the Non-Aligned Movement (NAM) amid the Cold War until its current participation with the G20 and BRICS. India's involvement is anticipated to change to move from a norm-taker to an active norm-making nation under Viksit Bharat @2047, actively participating in the normative frameworks and institutional architecture of global governance. Therefore, the main query is how can India use its democratic institutions and internal development plans to take the lead in forming global sustainable governance by 2047?

VISION OF VIKSIT BHARAT @2047

The Future Vision AI leadership for a developing country like India is about using intelligence to promote inclusive, equitable growth rather than just being technologically superior. True leadership in AI must be built on addressing India's most pressing issues, which include increasing small farmers' agricultural yields, facilitating access to affordable healthcare, mass-customizing education, managing urban infrastructure, and efficiently delivering citizen services. By doing this, India can also produce strategies for the developing nations of the world that are flexible and scalable. India has a unique opportunity to advance beyond conventional developmental phases thanks to AI. AI can assist in getting beyond infrastructure and resource limitations in fields like education, diagnosis, and governance, according to how mobile phones helped get around landlines. India can reimagine inclusive, accessible, and reasonably priced development paradigms by integrating AI into social services and public platforms. However, we must interpret success in the context of India. Instead of focusing only on patents, magical creatures, or global rankings, it should be judged on how successfully AI benefits rural communities,

overcomes language and economic obstacles, and allows all citizens to participate in the digital economy. The goal is clear: an India that leads with compassion, responsibility, and purpose a country that embodies the ideals of Viksit Bharat 2047, where AI is a transformative force rather than an elite tool.

The long-term goals of Viksit Bharat are outlined in government policy documents & think tank publications (NITI Aayog, 2022). These emphasize digital governance, inclusive growth, sustainable infrastructure, and environmental stewardship as key development pillars. According to academics, India's 2047 vision would function as a strategic paradigm in global governance, presenting India as a responsible participant influencing the norms of international cooperation in addition to being a developing nation in need of assistance.

Artificial intelligence-powered solutions have the ability to improve the availability of healthcare in rural areas, empower economically underprivileged people, and tailor learning experiences. However, pursuing Responsible AI with steadfast resolve is required to achieve this aim. To ensure that artificial intelligence appears to be a force for positive change that will not leave anybody behind, strong ethical frameworks, open development processes, and ongoing monitoring of AI solutions are necessary. Multi-stakeholder discussions involving the government, non-profit organizations, and the corporate sector are vital to creating an environment that supports the development of sustainable artificial intelligence in accordance with Viksit Bharat's inclusive development goals. If India can responsibly utilize the potential of artificial intelligence, it can close the gap towards a wealthier and equal future for all of its citizens.

INFRASTRUCTURE DEVELOPMENT IN INDIA

In recent years, India's infrastructure development has advanced remarkably. It saw the construction of the world's longest highway tunnel and the inauguration of the highest railway bridge in the world. The government has launched a number of large-scale projects to promote urban growth, redevelop cities, and enhance public infrastructure, including the Smart Cities Initiative, Bharatmala Pariyojana, & Atal Mission for Restoration & Urban Transformation. Inland connectivity will be enhanced via improvements and extensions to ports, railroads, airports, and highways. By implementing 5G networks and a type of broadband service in rural areas, India also hopes to improve its digital infrastructure. Another important aspect is long-term sustainability. Energy-efficient building development and a variety of renewable energy projects are being promoted by initiatives such as the Eco Niwas Samhita. The endeavor to accommodate the expanding population within urban areas also includes the revitalization of metropolitan districts and the construction of affordable homes. India will need to continue concentrating on infrastructure development even if significant progress has been made. Indeed, infrastructure is the cornerstone of technical innovation, social justice, and economic growth. India has the capacity to build a robust, inclusive, and forward-thinking economy that fulfills the ambitions of this varied population and becomes a global leader by guaranteeing infrastructure development at every level. Infrastructure that is physical: India's physical infrastructure requires major improvements for Viksit Bharat @2047. To ensure that the nation operates smoothly in all respects, expenditures must be made

to enhance the country's transportation networks, which include ports, airports, railroads, and highways. Government initiatives like multimodal logistic parks (MMPLs) to provide optimal transportation, the development of railway networks with high-speed railway corridors along with the conversion of regular rail bogies to Vande Bharat specifications, and the upgrading and creation of new ports would all benefit from funding and risk management support. Investing in efficient supply chain infrastructure and logistics will boost trade and commerce, which will boost growth overall. By sharing the associated risks and financial responsibilities, PPPs may also be used to finance and carry out such large-scale projects. Through smart city & industrial city programs, urban infrastructure modernization would guarantee optimal resource usage, less negative environmental impact, and enhanced living conditions. The demand towards consumption will rise as a result of these activities, and financial institutions' lending assistance will need to be sustainable. Therefore, India will draw investment, increase productivity, and contribute to realizing its goal of being a developed country by 2047 by building a connected and contemporary physical infrastructure. Digital infrastructure: To reach the Viksit Bharat @2047 goal, a resilient and robust digital infrastructure is needed. By allowing high-speed internet in all rural and remote locations, an extensive investment along with an encouragement plan would help close the digital divide and pave the way towards inclusive growth through improved financial service penetration across the country. The subsequent phase of digital transformation would also be facilitated by investments in cutting-edge technologies like blockchain, AI, and quantum computing. More financial inclusion will be fueled by innovative FinTech technologies that help make digital payments, mobile banking, and other financial services accessible to a larger population. India would only be enabled to empower its people and spur economic innovation by making smart investments in cooperation.

Social infrastructure: Renewable and sustainable initiatives, like renewable energy, sustainable transportation, and green buildings, can be financed through innovative financial products like carbon-neutral company accounts, green bonds, and sustainability-linked loans. The percentage of green bonds is still far higher than that of social bonds, even though green, social, sustainability, and sustainability-linked (GSSS) assets have grown dramatically in recent years. This suggests a lack of funding for social programs, including social assistance, healthcare, and education. The future workforce is better prepared for the rapidly changing needs of a dynamic economy when educational institutions are outfitted with cutting-edge learning technology and curricula. All citizens will have access to healthcare, particularly in underserved areas, if healthcare infrastructures, including telemedicine services, are improved. Programs should be designed to help vulnerable groups overcome their obstacles in order to promote social justice and stability. Finally, social welfare initiatives can be financed by PPPs. Since education is the cornerstone of innovation, sustainable development, and socioeconomic growth, it is essential to achieving this goal. An important turning point in India's educational reforms is the National Education Policy (NEP) 2020. It is intended to modernize the educational system to meet the demands for a modern India and handle current issues. The policy's emphasis on multidisciplinary learning seeks to dismantle traditional educational silos and promote an all-encompassing strategy that incorporates technology, the

arts, sciences, and vocational skills. Inclusion is one of the key tenets of this change. NEP 2020 addresses long-standing inequalities in education between gender, geography, and socioeconomic strata by emphasizing fair access to high-quality education for everyone, especially for marginalized communities. Employability is another crucial area of concern. A curriculum that incorporates future-ready abilities like critical thinking, computer literacy, & problem-solving is necessary due to the changing needs of the global labor market. To close the gap between academic knowledge and real-world applications, the policy also encourages industry-academia partnerships and vocational education.

DIFFICULTIES IN THE CURRENT EDUCATION SYSTEM IN INDIA

Although India's educational system has advanced significantly over the years, a number of issues still exist that prevent it from advancing the Viksit Bharat 2047 vision. In order to guarantee a fair, inclusive, and internationally competitive educational system, these challenges must be addressed.

✎ **Differences in Quality:** In India, the quality of education varies greatly by region, with the differences between rural and urban areas being especially noticeable. Rural schools sometimes struggle with limited facilities and teacher shortages, along with out-of-date resources, whereas urban schools often have stronger infrastructure and access to skilled teachers, along with modern teaching tools. Students from underprivileged areas have fewer possibilities as a result of this gap, which leads to uneven learning outcomes.

✎ **Outdated Courses:** Many Indian universities and educational institutions still use curricula that are out of step with the ever-evolving needs of industry and international norms. It frequently prioritizes memorization over creativity, critical thinking, and problem-solving abilities. Because of this, graduates might not have the abilities needed to thrive in a cutthroat, technologically advanced global industry.

✎ **The Digital Gap:** The digital divide Unequal usage of technology and internet connectivity has come to light as a result of education's increasing reliance on digital technologies. Due to the absence of equipment and dependable internet, students in rural & remote places frequently face obstacles to e-learning and are at a disadvantage when compared to their metropolitan peers.

✎ **Training of Teachers:** Despite being the foundation of the educational system, teachers' professional development is not given enough attention. Modern pedagogical approaches, such as the use of digital technologies, interactive learning strategies, and individualized teaching approaches, are not taught to many educators. Both student participation and the quality of overall education provided are hampered by this.

✎ **Rates of Dropout:** High dropout rates continue to be a serious problem, particularly for underprivileged populations. This problem is exacerbated by elements including lack of access to high-quality education, gender-based discrimination, and poverty. Many students drop out of school early in order to provide for their family or because they don't think the education they receive is worthwhile. Potential talent is lost as a result, and poverty and inequality cycles are sustained. A diverse strategy is needed to address these issues, including infrastructure investment, curriculum reform, incorporating

technology into instruction, teacher training, and policies that specifically target underrepresented communities. India can only develop an education system that can propel it toward the goal for Viksit Bharat 2047 by addressing these structural problems.

METHODS OF TRANSFORMATION STRATEGY

India's educational system must undergo a significant overhaul in order to realize the goals of Viksit Bharat 2047. In order to solve current issues and build an education system that is prepared for the future, the following pathways highlight essential reforms.

Technology Integration and Digital Literacy

The cornerstone of success in a technologically advanced environment is digital literacy.

- **Encourage e-learning platforms:** Projects like SWAYAM and DIKSHA can be expanded to offer high-quality content that is available to everyone. To promote inclusivity, disadvantaged pupils should be given access to devices and digital infrastructure.
- **Increase access to high-speed internet:** By bringing dependable internet connectivity, particularly to rural & isolated locations, public-private partnerships can aid in closing the digital divide.
- **Make use of artificial intelligence (AI):** Artificial intelligence (AI) can improve learning results by enabling tailored learning experiences that adjust content to each student's needs, pace, and abilities.

3.2 Vocational Training and Skill Development

Aligning education with industrial demands is necessary to prepare students for the workforce.

- **Launch vocational courses:** Secondary schools should offer vocational training, emphasizing trades & technical skills that are applicable to both domestic and international markets.
- **Future-ready curriculum:** To educate students for new sectors, incorporate classes on robotics, coding, artificial intelligence, and renewable energy.
- **Industry collaborations:** Work together with businesses to provide practical instruction, internships, and exposure to the working world, facilitating a smooth transition from school to career.

3.3 Enhancing Programs for Teacher Training

Teachers are essential to the quality of education; hence, their training is very important.

- **Professional development:** Technology utilization, student engagement tactics, and contemporary teaching approaches should be the main topics of regular training programs.
- **AI and digital tools:** AI-based performance trackers, for example, can be used to assess teacher efficacy and customize training to fill in gaps.

3.4 Education That Is Inclusive

In the pursuit of a developed India, inclusivity guarantees that nothing is left behind.

- **Focus on underprivileged groups:** To increase access for disadvantaged communities, priority should be given to outreach initiatives, local language educational resources, and scholarships.

➤ **Environments that are inclusive of gender:** By offering secure learning environments, assistance with menstrual hygiene, and gender-sensitive instruction, you may remove obstacles to female education.

3.5 Holistic and Multidisciplinary Education

Critical thinking, creativity, & flexibility are all promoted by holistic education.

➤ **Put NEP 2020 into action:** Break down conventional academic barriers to promote adaptable and transdisciplinary learning. For instance, students can integrate vocational, scientific, and artistic courses into their coursework.

➤ **Experiential learning:** Encourage practical projects, internships, & real-world problem-solving activities to foster creativity and practical knowledge.

3.6 Reforming Higher Education

Institutions of higher learning must promote international cooperation, innovation, and research.

➤ **International partnerships:** Work together with foreign universities to promote information sharing, cooperative research, & exposure to international best practices.

➤ **Financial autonomy:** Give universities the freedom to focus on innovation, manage resources, and draw in top personnel.

➤ **Increased research and development investment:** To establish India as an internationally recognized center for scientific and technical breakthroughs, increase funding for STEM research. These strategic avenues support India's goal of developing an inclusive and fair educational system that satisfies 21st-century aspirations. By putting these reforms into practice, India can develop a workforce that is highly qualified, creative, and competitive worldwide, advancing the country's dream for Viksit Bharat 2047.

INDIA'S CURRENT STATE OF DIGITAL INFRASTRUCTURE

Over the past ten years, India's digital infrastructure has experienced a spectacular transition; nonetheless, the growth has been uneven, with places of severe under-service coexisting with zones of world-class capabilities. As a result, the national image is a combination of both advancement and enduring inequality. The democratization of data access has been the most noticeable accomplishment. Accessible connection has increased the number of users and changed the demographics of those involved in the internet-based economy. The development of Digital Public Infrastructure (DPI) has been equally revolutionary. With more than 1.42 billion users, Aadhaar is the major biometric identification system in the creation and has made safe authentication possible for both public and private services. In December 2024, the Unified Payments Interface (UPI) handled over 16.7 billion transactions, making it a global case study with open, interoperable digital payments. By enabling direct benefit transfers with hundreds of millions, the Jan Dhan Aadhaar Mobile (JAM) trinity substantially reduced corruption and leaks. These networks are more than just services; they serve as public utilities that have improved transparency and

reduced transaction costs to an extent that is comparable to the economic impact of physical infrastructure.

Digital Infrastructure's Significance for National Development

Instead of existing as a separate economic sector, digital infrastructure serves as the foundation for all other sectors. It is important for national security, social progress, economic growth, good governance, and protecting the environment. Broadband connectivity is widely acknowledged as a major factor in GDP growth from an economic standpoint. A ten percent rise in broadband coverage can raise GDP growth by 1% to 1.5 percentage points in developing nations, according to studies. Additionally, studies show that faster internet speeds have a major positive impact on economic growth; for example, doubling an economy's broadband speed boosts GDP by 0.3%.¹⁴ The growth of reasonably priced mobile broadband in India has already made it possible for completely new industries to emerge, such as app-based logistics, fintech, and the creation of digital content. It has also increased the productivity of more established industries, such as manufacturing and agriculture, through e-commerce, optimized supply chains, and real-time market data. Digital infrastructure serves as the link between social inclusion and exclusion. Patients no longer need to travel great distances for specialist consultations at rural health centers because of telemedicine systems like eSanjeevani. By transcending the constraints of the physical infrastructure of schools and colleges, educational platforms like DIKSHA and SWAYAM have introduced structured learning into households. However, these applications need internet connections with the latency, bandwidth, and dependability required for large-scale data interchange, real-time communication, and video streaming. Digital infrastructure facilitates reach, efficiency, and transparency in government. Only the combined strength of Aadhaar for authentication of identity, wireless networks for outreach, & the banking system for financial inclusion make India's Direct Benefit Transfer (DBT) schemes, which send subsidies straight into bank accounts, possible. With a focus on security, low latency, and resilience against cyberattacks, the demands on infrastructure will only increase as government services shift to predictive and AI-assisted decision-making. National security considerations intimately intertwine with digital infrastructure. The resilience as well as sovereignty of these systems are strategic imperatives in an era where essential infrastructure, including transportation networks, defense communications, and power grids, is increasingly interconnected.

In addition to providing access to faraway locations, satellite communication provides redundancy in the event of a terrestrial network failure. Digital infrastructure has two roles to play in environmental sustainability. On the one hand, technology makes efficiency improvements that lower carbon footprints possible, such as IoT-based waste management and smart grids. However, since data centers and network operations use a lot of energy, they need to become greener. India's dedication to renewable energy offers a chance to sustainably power its digital expansion, making green infrastructure a competitive edge. The demands for digital infrastructure will change at an unstoppable rate. By the middle of the 2030s, industry, healthcare, education, and governance will extensively use AI models. It is anticipated that quantum communication networks would coexist with traditional internet infrastructure by the early

2040s, changing security and trust paradigms. Global commerce, entertainment, and education will benefit from immersive, high-bandwidth platforms enabled by Extended Reality (XR) technologies. The latency & security of a country's networks will determine its competitiveness just as much as its GDP growth rate. All aspects of economic, social, and governmental life will be altered by the confluence of artificial intelligence (AI), advanced communications, satellite-terrestrial networks, immersive content distribution, and distributed computing.

India's Present Position in International Sustainable Development Governance

India's place in world governance has significantly changed since gaining its independence. India has changed from a post-colonial nation that promoted equality and sovereignty to becoming a rising force influencing global standards. Regional coalitions, developmental partnerships, multilateral organizations, and climate diplomacy demonstrate India's involvement in sustainable development. India, poised to embark on a transformative path, has plans to become Viksit Bharat (Developed India) before 2047, marking 100 years of its independence. The strategic application of technological advances and innovation is a key component of this ambitious vision's roadmap. In a time of digitization, AI, green energy, space exploration, and biotechnology, as well as inclusive digital communities, technology is both a tool & a canvas that India will use to create its advanced future. India actively participates in the Sustainable Development Goals and the United Nations. The United Nations (UN) remains the primary forum for the global management of sustainable development, particularly through the 2030 Agenda and the Sustainable Development Goals (SDGs). India actively participated in the 2015 SDGs' formulation, calling for development to strike a balance between the three pillars of environmental conservation, social inclusion, and economic growth. India's UN High-Level Political Forum Voluntary National Reviews (VNRs) show how national policies complement international objectives.

THE ECOSYSTEM OF INNOVATION

• Developing Top-Notch Research

Building top-notch research capacity is essential to India's goal of becoming a leader in AI. It is essential to fortify prestigious establishments such as the IITs and IISc, including central research centres. For these institutions to support ground-breaking AI developments, they need to have access to a variety of datasets, state-of-the-art infrastructure, and high-performance computing resources. To close the gap between theoretical learning and real-world application, strong models of industry-academia partnership are crucial. Academics can match curriculum with industry demands by promoting collaborative projects, internships, and expertise sharing, and businesses can acquire new talent and creative ideas. Attracting foreign research investments through grants, incentives, and strategic alliances is crucial for improving India's status internationally. This will facilitate collaboration between Indian researchers and world experts in AI and encourage cross-border innovation. India must simultaneously concentrate on developing and safeguarding its own intellectual property. Promoting patents, start-ups, & spin-offs will guarantee that domestic AI technology supports economic expansion and international competitiveness. A key component of achieving India's AI objective by 2047 is creating this thriving research ecosystem.

• **The Revolution of Start-ups**

An active start-ups movement that is turning concepts into scalable enterprises is energizing India's AI industry. Indian AI start-ups are pioneering in various industries, including healthcare, agriculture, finance, education, and more. They range from early-stage businesses to unicorns as well as aspiring decacorns. In addition to tackling regional issues, these startups are creating globally applicable solutions. Innovation is no longer limited to urban centers like Hyderabad or Bengaluru. Thanks to increased internet connectivity, government-funded incubators, and rising digital literacy, Tier-2 and Tier-3 towns are becoming vibrant hubs for innovation. This regional diversity promotes inclusive growth by utilizing local talent and a range of viewpoints. This ecosystem has benefited greatly from government initiatives like Startup India, expanded financing programs, tax breaks, and regulatory changes. Infrastructure investments, such as accelerators and research parks with an AI focus, have further reduced obstacles for business owners. With goods designed for developing economies and industries with comparable development needs, Indian AI solutions have enormous export potential. India is positioned to evolve into a global artificial intelligence (AI) powerhouse as these firms grow, spurring innovation, generating employment, and making a substantial contribution to the academic economy established by Viksit Bharat 2047.

• **Development of Talent**

India's aspirations in AI depend on developing and keeping a talented, diverse workforce. It is crucial to provide possibilities that motivate Indian AI professionals to return or make remote contributions, even though many of them are looking for international exposure. Initiatives that support international cooperation and research exchanges help fuse local knowledge with best practices from around the world. Initiatives for corporate reskilling and training are growing quickly to keep up with the rapid advancement of AI technologies. To upskill workers and provide employees with cutting-edge knowledge, top businesses and startups provide certification programs, boot camps, and platforms for continuous learning. An inclusive innovation environment depends on more women entering AI-related fields. Scholarships, mentorship programs, female-driven incubators, & targeted hiring practices are some of the measures being taken to reduce the gender gap and guarantee that a variety of viewpoints inform the development of AI. A smooth transition from education to the workplace is essential to creating a strong talent pipeline. Students are exposed to AI principles through basic AI education, coding clubs, & hands-on workshops; internships and apprenticeships are provided by collaborations between academic institutions and businesses. By empowering the coming century of Indian artificial intelligence (AI) experts, this all-encompassing strategy seeks to guarantee that Viksit Bharat 2047 will be powered through talent that is competent, inclusive, and prepared for the future. Infrastructure and Facilitators

• **The backbone of the digital world**

India's AI-driven future requires a strong digital backbone, and recent developments point to significant progress. High-speed, low-latency connectivity is promised by the countrywide rollout of 5G, opening up new opportunities for real-time AI applications, such as smart agriculture and telemedicine in remote

communities. Increasing rural connectivity will make digital services accessible throughout the nation, thereby bridging the divide between urban and rural areas. India is investing in flexible cloud infrastructure and rapidly growing its extensive system of data centers to meet the enormous data and compute demands of artificial intelligence. These facilities speed up innovation and deployment by providing businesses and government organizations with affordable access to powerful computer resources. Data protection and cybersecurity become critical as digital ecosystems expand. Strict data privacy regulations and AI-powered threat detection technologies assist in protecting citizens' information and upholding confidence in digital networks. India has demonstrated its dedication to green computing by implementing renewable electricity for data centers, energy-efficient hardware, and cooling solutions. In addition to lessening the environmental impact, sustainable technology practices support India's larger objectives of sustainable development and climate responsibility, strengthening the digital backbone's resilience and readiness for the future.

• **The regulatory**

India's regulatory framework is essential for promoting AI innovation while protecting the rights and interests of its population. Building public trust requires finding the ideal balance between promoting technical advancement and guaranteeing consumer protection. Rules must allow for experimentation and development without sacrificing openness, equity, or safety. Data is the foundation of AI, and India's evolving data localization and privacy regulations ensure the secure and ethical management of private data. Strict restrictions on using information, consent, & cross-border transfers are required by the Law on the Protection of Personal Data along with accompanying standards, which strengthen organizational accountability. India has set up AI principles and governance committees made up of professionals from academia, business, and civil society to handle difficult ethical issues. These organizations promote ethical AI development in line with India's social and cultural values by establishing criteria for analytical fairness, bias mitigation, & transparency. By adhering to worldwide AI standards and taking part in multilateral forums, India also actively participates in international cooperation. Cooperation on cybersecurity, AI standards, and cross-border data flows guarantees India's continued integration into the global artificial intelligence (AI) ecosystem while preserving its sovereignty and populace. When taken as a whole, these actions establish a regulatory framework that fosters ethical AI leadership, safeguards rights, and encourages innovation.

• **Investment and Funding**

India's AI aspirations depend on sustained financing. With significant financial investments, the government has started programs, including the National AI Mission, to support infrastructure development, companies, and research. These public investments lay the groundwork for capacity building and innovation. With rising investments in corporate R&D facilities, technological accelerators, and AI-driven companies, the private sector serves an essential part. Prominent Indian and international businesses are supporting AI initiatives that target both local and foreign markets, increasing their financial viability. As international development organizations and venture investors see India's potential

as a major AI powerhouse, international investment and collaborations are also expanding. In addition to money, these partnerships provide market access and experience. Additionally, with an increase in listings & funding rounds that support the scaling of breakthroughs, capital markets have grown more open to AI businesses. These funding sources work together to provide a comprehensive ecosystem that supports India's transition to AI leadership.

• **Taking the Lead in International Discussions**

As it promotes frameworks that strike a balance between innovation, ethics, transparency, & human rights, India is becoming a significant voice in the development of AI governance and global norms. By actively engaging in international forums, India influences policies that ensure artificial intelligence (AI) innovations benefit the general good while upholding justice and security. Another cornerstone of India's international involvement is its advocacy of sustainable development via technology. The United Nations uses AI to advance the Sustainable Development Goals, addressing issues such as economic inclusion, healthcare access, education, and climate change. This initiative shows how technology can propel fair progress. India, which promotes responsible AI for mankind, places a strong emphasis on creating AI systems that put human welfare, equity, and dignity first, making sure that technology helps all facets of society without escalating inequality. India also places a strong emphasis on data rights and digital sovereignty, arguing that in the face of increasing digital globalization, countries should retain oversight of their data and safeguard the privacy of their citizens. This position promotes a collaborative internet ecosystem in which data flows honor cultural norms and country legal frameworks. Through these initiatives, India establishes itself as a global leader in accountability and promotes international collaboration that utilizes AI for ethical, sustainable, and inclusive development.

• **The Digital Gap**

The urban-rural technology divide continues to be a major obstacle to the equal adoption of AI, notwithstanding India's impressive digital advancements. Cities have access to high-speed internet and cutting-edge digital tools, but many rural areas still lack basic connectivity, which restricts their ability to use AI-powered services in governance, healthcare, and education. Linguistic variety further complicates this divide. Given India's 22 official languages and hundreds of dialects, we need AI systems that can comprehend, translate, and communicate in numerous languages. The absence of strong localization continues to shut out millions of people who don't know English from digital prospects. Affordability presents another significant obstacle. The inability of many low-income households to purchase digital equipment, data subscriptions, or cellphones limits their ability to engage in the AI-driven economy. Even when devices are available, digital literacy gaps hinder their effective use. Last but not least, inconsistent service delivery in rural areas is hampered by infrastructural constraints, such as erratic electricity, inadequate network coverage, and a lack of data centers. Targeted investments in connectivity, reasonably priced technology, multilingual artificial intelligence (AI) solutions, & user education are necessary to address these issues. To meet the promise of equitable development during

Viksit Bharat 2047 and guarantee that AI's advantages reach every person, it is imperative to bridge the digital divide.

• **Employment and Skills**

The development of AI unavoidably raises concerns about job displacement, particularly in industries that rely on repetitive or manual labor. Automation may eliminate some jobs, but it also creates opportunities by increasing output and allowing employees to focus on higher-value tasks. Effective transition management requires an understanding of how to reconcile these realities. To adapt to changing employment requirements, India's large workforce needs extensive reskilling and upskilling programs. To provide scalable learning platforms centered on artificial intelligence (AI) literacy, digital skills, & emerging technologies, government efforts, business training, & vocational institutes must work together. This strategy lowers the chance of long-term unemployment while facilitating employees' seamless transfer into other roles. From data annotation & AI ethics experts to artificial intelligence (AI) maintenance technicians & innovation managers, AI is also generating completely new job categories. Promoting innovation and entrepreneurship in these developing industries would create various job possibilities in India's cities and rural areas. Strong social safety nets, including income support, healthcare access, and unemployment benefits, are crucial to helping workers during this transition. When taken as a whole, these steps will ensure that India's workforce is resilient in the face of AI-driven change and that economic growth is sustainable and inclusive.

• **Social and Ethical Issues**

Addressing social and ethical concerns is essential as India adopts AI to make sure the technology benefits all residents equally and responsibly. Fairness and bias reduction should be prioritized since AI systems educated on biased data run the risk of sustaining current disparities, whether they be caste, gender, or geographic. To prevent unintentional discrimination, algorithms must be sensitive to India's complex social fabric. Another urgent issue is privacy. At a time when AI-enabled monitoring may follow people widely, protecting confidential information is crucial. India's changing data protection laws seek to protect citizens' privacy while striking a balance between national security & innovation, but there is still work to be done in the area of public awareness and enforcement. To reflect India's varied society, AI solutions must acknowledge cultural sensitivities & values. Instead of enforcing universal frameworks, AI should be tailored to local circumstances in terms of language usage and ethical standards. Lastly, democratic AI system governance is crucial. Accountability, transparency, and public involvement in policymaking ensure that AI technologies align with societal objectives and human rights. India can generate trust and promote fair advancement during the AI journey by including ethical standards in the development and application of AI.

• EVALUATIONS OF SUCCESS

A balanced set of financial, social, and innovative measures is needed to gauge India's success in AI. Economic success will be demonstrated by AI's effect on GDP growth, higher exports of AI services and technologies, and the development of new job possibilities in a variety of industries. Impact on society is equally important. AI's involvement in improving lives and guaranteeing equitable growth will be demonstrated by improvements in healthcare results, improved education quality through individualized learning, and increased efficiency in public services and governance. India's ability to develop cutting-edge AI solutions will be demonstrated by tracking innovation through the quantity of patents filed, published studies, & the rise in start-up valuations & funding rounds. Lastly, India's position in international forums and global AI rankings will demonstrate its leadership and influence. Together, these measures offer a thorough framework for evaluating advancement, directing policy, and commemorating significant events along the route for Viksit Bharat 2047.

• The Goal Achieved by 2047

India will become the Global South's leading center for AI solutions, providing affordable, culturally relevant technology that tackles common problems. As AI empowers all residents while upholding human dignity and a variety of cultural values, the country will serve as an example of affluent, inclusive, and sustainable growth. India's strategy, which strikes a balance between innovation, ethics, and social justice, will serve as a global example for responsible AI leadership. This vision envisions a future in which technology serves as a force for fair advancement, improving communities and motivating countries all over the world to use AI for the benefit of all people.

Actual Narratives from India's Varied Terrain

AI is already profoundly and individually changing lives all over India. Small farmers in the Raichur area of Karnataka are now employing artificial intelligence-powered mobile apps to get weather forecasts, crop recommendations, and reports on soil health in Kannada. With lower input costs, their yield has grown by 30%. Assam's maternal and newborn death rates have decreased because of telemedicine kiosks that use AI diagnostic technologies to provide timely care to rural people. Using a rural skilling project in Jharkhand, tribal kids are receiving training in artificial intelligence (AI) and data annotation, which will prepare them for jobs in international tech supply chains. In the meantime, AI is greatly enhancing student retention and academic achievement in government schools in Tamil Nadu by identifying school dropouts and tailoring remedial instruction.

A STRONG ENVIRONMENT FOR INNOVATION

The 21st century provided a new era for AI. This has changed all aspects of life, including how people live, work, and interact. Artificial intelligence is not only important for scientific progress but also for the smooth running of modern society because it boosts productivity and economic growth, along with data-driven decision-making. Li et al. say that artificial intelligence (AI) makes people more competent and lets them focus on tasks that need creativity and preparation. Businesses in many fields, like banking,

health care, transport, shipping, and manufacturing, can get ahead of their competitors by automating their operations. This saves time and money by cutting down on the amount of labor and resources wasted on regular and repetitive tasks. Trabelsi (2024) contends that artificial intelligence fosters creativity, facilitates the establishment of novel industries, and generates new employment prospects, all of which contribute to the continuous economic advancement of nations. However, automation powered by artificial intelligence has put people out of work in many fields. Because of this, workers need to be retrained and given new skills to keep up with the needs of new and changing employment (Onifade et al. 2022). AI technologies give businesses and governments data-driven insights that help them make decisions and set policies in many areas, including public health, education, transportation, and city planning (Marwaha et al., 2024). On the other hand, artificial intelligence's growing role in everyday life has raised serious concerns regarding privacy, bias, and responsibility, including the use of moral standards (Radanliev, 2025). If AI is going to provide services that are fair and open to everyone, these problems need to be fixed. Artificial intelligence is expected to completely revolutionize and change schools all over the world by 2030. This is because artificial neural networks will be able to offer more personalized training, make things easier to get to, and improve the efficiency of administration. AI will completely change the way teachers educate and how they teach, making learning more exciting, engaging, and rewarding for students all across the world.

To make this happen, we need a strong environment for innovation, programs that help people grow skills, and well-planned spending on research and development. India has effectively built digital public infrastructure in the past, such as Aadhaar, UPI, and Jan Dhan. This shows that massive, inclusive platforms can be built. India has made progress in AI because of rigorous preparation and swift action. The government is aggressively building a machine learning ecosystem that will help its citizens and encourage new ideas by increasing its computing capacity, encouraging the construction of regional computational models, and giving enterprises help. Projects in the areas of learning, health, and agriculture, along with governance, show how theoretical ideas can be put into practice. Everyone can be guaranteed that innovation will reach them through key projects such as the India Machine Learning Mission, Digital ShramSetu, and basic model development. These programs also help with research, skills, and starting a business. These projects put India in a good position to do well in the robotics (AI) field and fit with the goals regarding Viksit Bharat 2047.

To do this, there has to be a robust environment for innovation, programs that focus on training skills, and well-planned R&D spending. India has effectively built digital public infrastructure in the past, such as Aadhaar, UPI, and Jan Dhan. This shows that massive, inclusive platforms can be built. India has made progress in AI because it planned well and acted quickly. The government is aggressively building an AI system that will help its citizens and encourage new ideas by increasing its computing capacity, encouraging the construction of regional frameworks, and supporting businesses. Theoretical ideas can be put into practice through projects in the fields of education, healthcare, agriculture, and governance.

With major projects including the India Machine Learning Mission, Digital ShramSetu, and basic model development, everyone can be sure that new ideas will reach them. These programs also help with entrepreneurship and skills, along with research. These projects set India up for success in the robotics (AI) field and are in line with the goals of Viksit Bharat 2047.

Mehta et al. (2025) say that as India becomes ready to reach the objective known as Viksit Bharat 2047, which is to have a fully modernized and advanced country by its 100th anniversary of independence, the role of AI in education is growing in significance. It is expected to be very important to the Viksit Bharat 2047 initiative, which aims to give all citizens the skills, values, and information they need to grow and compete in the world. The goal of the education plan is to make sure that everyone is literate and involved by making learning available through formal institutions, digital platforms, and food for the poor, underserved, and underprivileged. This program helps students with disabilities work toward establishing a fair, future-ready, and strong country. With the help of qualified teachers along with competency-based assessments, the curriculum will be changed. In this kind of environment, thinking, creativity, and learning for life can all flourish. The Viksit Bharat vision calls for the use of bridge programs and hostels, as well as scholarships, to help fix social and provincial inequities. By 2047, kids and young people will have the coding and digital literacy, along with the cutting-edge tech skills, they need to help make Viksit Bharat a technologically advanced place. Vocational education, which aims to promote continuous skill enhancement and prepare individuals for the demands of the future labor market, will be employed to achieve this (NITI Aayog, 2025). India also needs a solid legal and policy framework to make sure that AI is used in all areas, including education, in a responsible and moral way. To do this, there must be fairness, responsibility, and openness, as well as respect for people's right to privacy. It is also important that this framework stay flexible along with the authorities keeping an eye on it to make sure it is up to date regarding the most recent problems and can handle the new ones that keep coming up, because technology is changing so quickly these days. NITI Ayog's "Adaptive Knowledge to Obtain Sustainable Societal Development" (released in October 2025) lays out a plan on how to use technology to change India's informal labor. Some of the most important questions it raises are: How can the world's cutting-edge technology be made available to the workers who are most in need of it so they may overcome problems and be a real part of India's economic success? This study is based on the experiences of people who work in informal settings. It shows the problems and goals of a farmer, a craftsman who works in India's capital, and a family doctor in Rajkot, along with many other people. These stories show how society still has a lot of problems and how smart use of technology could open up a lot of new opportunities. Technology should not replace the skills that employ millions of people; it should improve them. The roadmap talks about a number of new technologies that could help India's 490 million informal laborers with their systemic challenges. These include robotics, blockchain computing, artificial neural networks (AI), and the growing Internet of Things, along with immersive learning. It sees a day in 2035 when voice-first AI applications will have been equipped to get over language and literacy obstacles. Smart contracts will make sure that payments are clear and on time. With micro credentials along with

on-demand learning, people will be empowered to improve their skills at the speed that works best for their goals. This concept is based upon the Digital ShramSetu scheme, a nationwide effort to bring cutting-edge technologies to India's informal sector on a large scale. The goal stresses state-led implementation, strategic alliances, regulatory support, and individuals or sectors setting priorities to make sure that the goal is affordable and widely adopted. A strong multi-level societal evaluation system will help the government, businesses, and civil society work together. This report's goal is to bring attention to the reality that hope alone won't be enough to accomplish this digital leap. To do this, we need a vibrant innovation ecosystem, skill-building programs that are focused, and well-coordinated spending on research and development. India has effectively built digital public infrastructure in the past, such as Aadhaar, UPI, and Jan Dhan. This shows that massive, inclusive platforms can be built. India has made progress in AI because of rigorous preparation and swift action. The government is aggressively building an AI environment that will help its citizens and encourage new ideas by increasing its computing capacity, encouraging the construction of regional simulations, and supporting businesses. Projects in education, health care, farming, and governance show how theoretical ideas may be put into practice. Everyone can be assured that innovation will reach them thanks to strategic projects like the India Artificial Intelligence Program, the Digital ShramSetu, and basic model development. These programs also help with research, entrepreneurship, and skills. These projects put India in a good position to grow in the field of computational intelligence (AI) and are in line with the goals for Viksit Bharat 2047.

Youth, Women, and the Private Sector's Role

The proactive identification and all-encompassing assistance of the youth is essential to the Viksit Bharat Mission's success. The country can achieve its developmental objectives more quickly by utilizing their inventiveness and intellectual capacity. In order to guarantee inclusive and dynamic as well as sustainable governance, it is essential to include young people in the policymaking process. True human growth, according to our Prime Minister Shri Narendra Modi, depends on women's empowerment. This emphasizes how important women are to achieving the goal of a powerful, independent, and advanced country. A comprehensive strategy for women's empowerment that includes their active involvement in economic development, governance, & social advancement is required to realize the Viksit Bharat vision. This means eradicating discrimination and violence based on gender while also guaranteeing equitable access to healthcare, education, and economic opportunities. To empower women not just as recipients of development but also as important contributors to advancement and development, a comprehensive approach is necessary. Based on the National Economic Survey 2024-25, private investment is essential to achieving Viksit Bharat @ 2047 since public monies alone cannot satisfy infrastructure demands. Economic development and growth are mostly driven by private investment. Establishing an atmosphere that encourages private investment, innovation, & entrepreneurship is crucial to realizing the goal of a developed India. Therefore, in order to accomplish the lofty objective of Viksit Bharat, cooperation between the public and commercial sectors is required.

Emerging technologies have the potential to significantly impact economic growth, facilitate effective governance, and stimulate sustainable development as India moves closer to its aspirational goal of being an advanced country by 2047. Technologies like computational intelligence (AI), blockchain, the Internet of Things (IoT), big data, cloud computing, analytics, and advanced robots are quickly changing a number of industries and reshaping how governments and corporations function in this digital age. These new technologies offer opportunities as well as problems to governance professionals. They present previously unheard-of opportunities to improve accountability, transparency, and process efficiency, but they also call for the creation of strong legal frameworks, moral standards, and capacity-building programs. Governance experts are in a unique position to handle these difficulties and guarantee accountable willingness to embrace emerging technologies as custodians of good governance, opening the path for India's transition to Viksit Bharat.

PARTNERSHIPS AND GLOBAL POSITIONING

• India's Distinctive Value Proposition

India's history of frugal innovation, which produces scalable, affordable solutions to real-world problems, sets the country apart in its AI path. India has a competitive advantage in creating reasonably priced AI apps that are appropriate for a wide range of demographics because of its capacity for creative thinking under resource limitations. Another distinctive feature of the nation is its bilingual landscape. A global standard for linguistic diversity as well as inclusion is being set by Indian AI developers who are creating multilingual AI systems that can comprehend and communicate in dozens of languages as well as dialects. India, which is based on democratic principles, promotes responsible technology development that is in line with social demands by emphasizing transparency, ethics, & citizen rights in AI governance. India is in a unique position to act as a bridge between the developed and developing nations by fusing innovation, diversity, & democratic ideals. This will enable it to produce AI solutions that are not just technologically sophisticated but also applicable and accessible in a variety of socioeconomic circumstances around the globe. As a result, India is now positioned to lead the world in comprehensive AI innovation.

• Strategic Alliances

Technology partnerships with friendly countries facilitate knowledge sharing, cooperative research, & co-development of AI solutions, all of which contribute to India's advancement in AI. Innovation is accelerated while strategic interests are protected through partnerships with nations such as the US, Japan, & the EU. South-South collaboration, in which India imparts its knowledge of AI to developing countries in Asia, Latin America, and Africa, is a major area of concentration. In addition to addressing common issues including healthcare, agriculture, & digital governance, this information exchange promotes group development. India's vast diaspora networks act as essential conduits, promoting international investment, mentoring, and talent circulation. By integrating Indian AI technologies with international ecosystems, these networks improve outreach and competitiveness. Additionally, India's presence in

global markets is increased by expanding trade and export prospects for its AI goods and services. India is establishing itself as a cooperative, accountable, and significant participant in the global AI scene by utilizing strategic alliances.

NEW TECHNOLOGIES: VIKSIT BHARAT'S DRIVERS

Innovation and Economic Growth: Emerging technologies are increasing productivity, boosting global competitiveness, and spurring innovation in a variety of industries. Fintech businesses are using blockchain and artificial intelligence (AI) in the financial sector to offer safe and easy digital financial services, encouraging financial inclusion and raising financial literacy. By providing individualized financial advice & investment suggestions, AI-powered chatbots and automated advisors are democratizing possibilities for financial planning services. Decentralized finance (DeFi) platforms and other blockchain-based solutions are simplifying trade finance procedures, lowering operating costs, and facilitating safe and transparent cross-border transactions. Industry 4.0, which combines IoT, cloud-based computing, big data statistical analysis, and advanced robots, is causing a significant upheaval in the industrial sector. IoT sensors, artificial intelligence techniques, predictive analytics, & robotic assistants (cobots) are facilitating smart manufacturing solutions that improve supply chain management, optimize operations, and reduce downtime. By identifying possible equipment breakdowns before they happen, predictive maintenance approaches can lower maintenance costs and increase operational effectiveness. By enabling mass customization and cutting waste, additive manufacturing, also known as 3D printing, is transforming product design and production. The use of developing technology is also helping India's agriculture industry, which is vital to the country's economic development and food security. Farmers are able to monitor crop health, maximize resource use, and make data-driven decisions thanks to precision agricultural approaches powered by Internet of Things (IoT) sensors, drones, satellite imaging, and data analytics. By reducing the overuse of water, fertilizer, and pesticides, this not only increases agricultural yields and decreases waste, but it also promotes environmental sustainability. Furthermore, blockchain-based solutions are improving the transparency and traceability of the supply chain, guaranteeing the safety and quality of food.

Transparency and Governance: Emerging technologies have enormous potential to improve governance frameworks and foster transparency in addition to economic benefits. With its decentralized, including impenetrable, structure, blockchain technology has the potential to transform safe data management and recordkeeping in a number of fields, boosting responsibility and confidence in procedures like supply chain traceability, identity management, and land registration. For example, a number of Indian state governments have been at the forefront of implementing blockchain technology for land administration, which has simplified real estate transactions and decreased fraud. AI-driven analytics can help with risk assessment, fraud detection, and compliance monitoring, allowing for proactive governance risk identification and reduction. Large volumes of data can be analyzed by machine learning algorithms, which can then spot trends and abnormalities and raise warning signs for

possible fraud or non-compliance problems. This can greatly improve the efficiency of monitoring and auditing procedures, guaranteeing compliance with legal requirements and moral principles. Artificial intelligence (AI)-based fraud detection systems have become prevalent in the banking industry to identify questionable transactions and stop financial crimes. When incorporated into public services and infrastructure, IoT devices can guarantee regulatory compliance and provide real-time monitoring. Smart meters and sensors, for example, can monitor emissions and energy use, improving adherence to sustainable energy policy and environmental standards. IoT-enabled devices in the healthcare industry can improve service delivery & regulatory monitoring by tracking patient well-being and medication compliance. IoT is being used by a number of smart city projects in India to improve public safety, traffic control, and garbage management.

Sustainable Development: One of the main tenets of Viksit Bharat is achieving environmental sustainability, and new technology can be quite helpful in this process. IoT, massive-data analytics, & AI-powered smart city projects can maximize resource use, lower carbon footprints, and enhance urban planning. Intelligent traffic management technologies, for instance, can improve air quality and reduce emissions by easing congestion. Energy efficiency and the incorporation of energy from renewable sources can be enhanced via smart grids & energy management systems. One excellent example of using cutting-edge technologies for sustainable development of cities comprises the India Smart City Initiative Mission. The shift to sustainable energy sources can be accelerated by combining energy storage devices, smart grid infrastructure, and renewable energy technology like sophisticated wind and solar power solutions. In order to maximize the efficiency & long-term sustainability of renewable energy structures, data analytics and artificial intelligence can be used to enhance their performance and placement. The National Solar Energy Mission and India's aggressive goals for increasing renewable energy generation are propelling the mainstreaming of these innovative technologies. IoT sensors, autonomous aircraft, satellite imaging, and data analytics have made precision agriculture approaches possible, which can minimize environmental effect while promoting sustainable food production. Farmers can maximize water use, minimize chemical inputs, and adopt sustainable farming techniques that support biodiversity, especially soil conservation, by closely monitoring soil conditions, productivity of crops, and weather patterns. To encourage the use of developing technology in agriculture, the Indian government has started a number of programs, including the Digital Agriculture Mission and the Pradhan Mantri Krishi Sinchayee Yojana.

OPPORTUNITIES AND DIFFICULTIES FOR GOVERNMENT PROFESSIONALS

Regulatory & Legal Frameworks: Strong regulatory & legal frameworks are becoming increasingly important as innovative technologies gain acceptance. To create complete regulations that cover issues with data privacy, cybersecurity, rights to intellectual property, and ethical consequences, governance professionals must work with legislators, stakeholder groups, subject matter experts, & legal

professionals. Finding the ideal balance between promoting innovation and defending the public interest is one of the main obstacles. While inadequate oversight can result in misuse, exploitation, and unexpected repercussions, too rigid rules can impede technology advancement and competition. In order to advocate for rules and regulations that encourage responsible innovation while reducing possible risks and safeguarding consumer rights, governance professionals must strike a careful balance. When conducting evaluations of impact, identifying probable dangers and weaknesses related to developing technologies, and suggesting suitable mitigation solutions, governance professionals may have a critical role. This could entail working with legal experts, civil society organizations, and technology specialists to create comprehensive, future-proof policies that adjust to the quickly changing technological context. For example, the Digital Personal Data Protection Regulations 2023, which go into effect in India on August 11, 2023, attempt to create a thorough framework for privacy and data protection while tackling the issues brought on by evolving technology. **Skill Development & Capacity Building:** Governance professionals must constantly improve their technology competencies in order to successfully negotiate the complexity of evolving technologies.

Specialized training programs, certificates, and knowledge-sharing platforms can be developed more easily through partnerships with government organizations, technology businesses, professional associations, and educational institutions. It is crucial to include emerging technology in the curricula of professional development programs and courses pertaining to governance. Modules covering blockchain principles, AI ethics, cybersecurity, data privacy and security, and the legal ramifications of emerging technologies may fall under this category. Governance experts can gain useful skills in utilizing these technologies for security, risk management, & governance procedures through practical training, workshops, and simulations. It is crucial to develop a workforce that is prepared for the future and has the technical and governance competencies required. To stay ahead of the curve and successfully navigate the opportunities and challenges presented by emerging technologies, governance professionals must adopt a mindset of continuous advancement and actively seek out opportunities to improve their computer skills and technological proficiency. Such capacity-building programs can be greatly aided by institutions such as the Institute of Company Secretaries of India (ICSI).

Encouraging Responsible Innovation: When it comes to encouraging the moral and responsible application of new technology, governance experts are essential. It is possible to guarantee that technical developments are in line with ethical standards and societal values by putting in place strong governance structures, codes of conduct, & best practices. Fostering responsible innovation will require completing impact assessments, holding multi-stakeholder discussions, and encouraging accountability and openness. The ethical ramifications of automation and artificial intelligence are a crucial factor. Concerns about algorithmic bias, privacy, & responsibility surface as AI systems grow more complex and independent. In order to mitigate potential dangers and respect ethical values, governance specialists can help build ethical rules and frameworks that guarantee AI systems are built and implemented in a democratic, open, ethical, and accountable manner. A step in the correct direction is the recent effort

from NITI Aayog to develop a framework towards Responsible AI. Data privacy and governance are other areas of emphasis. Large volumes of private and sensitive data have been generated and processed as a result of the growth of Internet of Things (IoT) devices and cloud computing, especially big data analytics. Professionals in governance must support strict data protection laws, make sure privacy rules are followed, and promote data governance procedures that preserve people's privacy and permit responsible data use. In industries like healthcare, whose patient data security is crucial, this is especially crucial. Additionally, by cultivating an organizational culture that values ethical concerns and social effect evaluations across the technology development lifecycle, governance experts can encourage responsible innovation. To guarantee that emerging technologies are created and implemented in accordance with moral standards and social norms, this may entail setting up ethics committees, consulting with stakeholders, and putting in place monitoring and reporting systems. It will be essential to set a good example and incorporate morality into organizational decision-making procedures.

INDIA'S LESSONS AND GLOBAL BEST PRACTICES

Global best practices for utilizing emerging technology for efficient governance can teach India important lessons as it moves toward Viksit Bharat. Blockchain-based solutions for safe data management & e-government services have been successfully adopted by nations like Estonia, which is well-known for its technological governance projects. The Estonian electronic residence program, for example, enables people and companies to create a digital identity and carry out a range of online transactions and services by utilizing the safety and transparency features of blockchain technology. The Smart Nation project in Singapore provides information on how to incorporate IoT, data analytics, & AI into public service delivery and urban planning. The country's Mobility-as-a-Service (MaaS) platform optimizes transportation infrastructure by lowering traffic and increasing accessibility using real-time data & AI algorithms. Urban policymakers and planners can simulate and analyze the effects of development projects on variables like traffic flow, usage of energy, & environmental impact thanks to Singapore's Virtual Singapore platform, which is driven by 3D modeling & IoT sensors. A strong framework for controlling the gathering, processing, and archiving of personal data is provided by the General Data Protection Regulation (GDPR) of the European Union, which sets the standard for data privacy and protection laws. The GDPR's tenets—such as purpose limitation, data minimization, and individual consent—can guide the creation of India's data protection laws, guaranteeing the ethical and responsible management of personal information. The IEEE's Ethically Aligned Design offers an extensive framework that prioritizes ethical issues in the creation of intelligent and autonomous systems. This program promotes the responsible development and application of AI & autonomous technology by providing guidelines on matters including transparency, responsibility, privacy, and human control. Other notable examples include Canada's Advisory Council regarding Artificial Intelligence, which provides recommendations on responsible growth and use of AI systems, and the United Kingdom's Centre to Data Ethics and Innovation, which provides guidance to the government on the ethical and societal consequences of emerging technologies.

With the help of international organizations, public-private partnerships, and the knowledge of world technological experts, India can take inspiration from these examples and modify them to fit its circumstances. To facilitate knowledge transfer and adapt international best practices to India's unique demands and difficulties, administration professionals may have a critical role. Additionally, governance experts can actively contribute to creating global norms and regulations for emerging technologies by participating in international forums & standard-setting organizations. Governance experts may exchange ideas, gain knowledge from different viewpoints, and influence the global conversation on responsible technology development and efficient governance frameworks by interacting with their international peers.

A GUIDE FOR PROFESSIONALS IN GOVERNANCE

Create a strong framework for rising tech governance: Create a thorough set of guidelines, rules, and procedures to guarantee the organization's acceptance and use of emerging technology in a morally sound, safe, and responsible manner.

Encourage the development of tech literacy: Organize workshops, training sessions, and knowledge-sharing events to improve stakeholders' comprehension of developing technologies, their uses, and their ramifications.

Assess the risks associated with developing technologies: To create effective risk mitigation strategies, regularly assess potential risks related to the adoption and usage of emerging technologies, especially data privacy and cybersecurity, including unexpected consequences.

Assure adherence to regulations: Ensure that the organization's procedures adhere to applicable laws and standards by keeping abreast of pertinent rules, guidelines, & industry standards pertaining to evolving technology.

Encourage cross-functional cooperation: To develop a comprehensive and well-rounded strategy for regulating emerging technologies, foster collaboration among governance experts, technology teams, legal professionals, risk management specialists, and other relevant departments.

Facilitate moral and accountable innovation: Partner using technology teams along with subject matter specialists to include ethical issues and promote transparency, along with ensuring alignment alongside organizational values along with societal good across the innovation lifecycle.

Encourage dialogue and cooperation with stakeholders, solicit their opinions, address their concerns, and make sure their interests are taken into account when making decisions about developing technological initiatives.

Encourage emerging tech accountability by putting in place methods for open reporting, unambiguous responsibility, and efficient management of modern technology systems, their choices, and their results. Make data security and privacy a top priority by creating strong data governance procedures that protect people's privacy and guarantee the safe handling and administration of data produced or processed by new technologies.

Encourage ongoing observation and enhancement: Monitor & audit the organization's acceptance and utilization of emerging technologies on a regular basis, making sure that ethical standards, legal requirements, and organizational rules are followed. Put procedures in place for continued adaptation and improvement as technology advances.

CONCLUSION

India's objective of achieving what is called "Viksit Bharat" (an economically developed India) before 2047 depends on communication and digital literacy. In addition to being a vision, Viksit Bharat 2047 represents a collaborative mission that calls for an innovation-first mentality. Technology must benefit people, alleviate inequality, and produce long-term benefits for all residents. India possesses the skills, aspirations, and assets to take the lead globally not only as a technology consumer, but also as a developer, regulator, and global leader in tech-led growth. By 2047, India may become a global leader in developed, egalitarian, and technologically driven progress by fully embracing innovation. Emerging technologies offer governance experts both enormous potential and formidable obstacles as India works towards its ultimate goal of Viksit Bharat. Governance experts may promote sustainable development, increase accountability and transparency, and stimulate economic growth by embracing new technologies and taking a proactive stance. But this path necessitates a determined effort to create strong regulatory frameworks, encourage moral and ethical innovation, and create a workforce that is prepared for the future and has the requisite governance and technology skills. To guarantee the proper acceptance of emerging technologies, governance experts must work with legislators, business stakeholders, and international organizations. They must also absorb lessons from worldwide best practices and modify them to fit India's particular situation. The governance landscape is changing as a result of emerging technologies, which present previously unheard-of chances for process simplification, increased openness, and data-driven decision-making. In order to ensure accountability and moral behavior across a range of industries, governance professionals can transform documentation, fraud detection, and surveillance of compliance, as well as risk management, by utilizing technologies like blockchain, artificial intelligence, the Internet of Things, and data analytics. Additionally, by enabling the shift to clean energy, smart cities, and precision agriculture, these technologies represent the key to achieving sustainable development goals and advancing India's overall progress towards creating a developed country. However, an anticipatory approach to rules and regulations, capacity building, and cultivating an ethical innovation culture are all necessary for the sustainable adoption of developing technology. In order to navigate these complications, advocate for strong data protection laws, encourage algorithmic accountability, and maintain moral standards in the creation and application of developing technologies, governance experts must take the initiative. In order to keep the governing workforce prepared to handle the opportunities and difficulties brought about by technology innovations, they must also place a high priority on skill development and ongoing education. Developing an ecosystem of efficient government, moral behavior, and sustainable growth is just as important to achieving Viksit Bharat as technological

innovation. With their knowledge and dedication to maintaining the highest possible standards of governance, governance professionals are well-positioned to significantly influence India's path to becoming a developed country by 2047. Governance professionals can help bring the Viksit Bharat vision to life and accelerate India's transformation by adopting emerging technology while giving ethical issues and societal effects top priority.

REFERENCES

1. AIIMS New Delhi reports on AI-enabled rural diagnostics. <https://www.aiims.edu/en.html>
2. Business Standard. (2021). "How AI is helping farmers in Punjab." https://www.business-standard.com/article/technology/how-ai-is-helping-farmers-inpunjab-121010500591_1.html
3. Economic Times. (2022). "AI training programs for rural youth in Jharkhand." <https://economictimes.indiatimes.com/news/india/ai-skills-rural-jharkhand/articleshow/>
4. Hindustan Times. (2021). "AI reducing corruption and improving services in Rajasthan." <https://www.hindustantimes.com/india-news/ai-improves-governance-inrajasthan-101623648568164.html>
5. <https://doi.org/10.4324/9780429197680>
6. [https://download.bibis.ir/Books/Cyber/Cyber-Threats/2025/Handbook%20of%20AI-Driven%20Threat%20Detection%20and%20Prevention%20A%20Holistic%20Approach%20to%20Security%20\(Pankaj%20Bhambri%20%20A.%20Jose%20Anand\)_bibis.ir.pdf](https://download.bibis.ir/Books/Cyber/Cyber-Threats/2025/Handbook%20of%20AI-Driven%20Threat%20Detection%20and%20Prevention%20A%20Holistic%20Approach%20to%20Security%20(Pankaj%20Bhambri%20%20A.%20Jose%20Anand)_bibis.ir.pdf)
7. Indian Council of Agricultural Research (ICAR). (2022). AI in Precision Agriculture: Success Stories from India. <https://icar.org.in/content/artificial-intelligence-agriculture>
8. Indian Express. (2022). "How AI is reshaping micro-lending and insurance." <https://indianexpress.com/article/technology/ai-microfinance-insurance-india-7712345/>
9. International Data Corporation (IDC). (2022). India Artificial Intelligence Market Report. IDC Asia/Pacific. <https://news.microsoft.com/en-in/2018/07/05/microsoft-and-icrisat-partner-to-helpfarmers/>
10. Ministry of Electronics and Information Technology (MeitY). (2022). AI in Governance: Success Stories from Smart Cities. <https://meity.gov.in/writereaddata/files/AI-Governance-Report.pdf>
11. Ministry of Electronics and Information Technology (MeitY). (2023). Digital India Initiatives and AI Impact Reports. Government of India.
12. Ministry of Housing and Urban Affairs. (2023). Smart Cities Mission: AI in Urban Planning and Governance. Government of India.
13. Ministry of Skill Development and Entrepreneurship (MSDE). (2023). AI Skilling and Training Programs in India. <https://msde.gov.in/>
14. NASSCOM. (2022). The AI Start-up Ecosystem in India. <https://nasscom.in/knowledge-center/publications/> NITI Aayog. (2020). AI for All: National Strategy for Artificial Intelligence.

Government of India. https://niti.gov.in/writereaddata/files/document_publication/NationalStrategyfor-AI-Discussion-Paper.pdf

15. Priti Goyal, Sunita Hooda, Sanjeeta Rani & Manisha Verma (2015). AI for a Better Tomorrow: India's Path to Global Leadership @Viksit Bharat 2047, 189-205. ISBN: 978-81-990245-5-7 <https://inspirajournals.com/uploads/Album/1464847674.pdf>

16. Reserve Bank of India (RBI). (2021). Financial Inclusion and AI-enabled Microfinance in India. <https://rbi.org.in/Scripts/AnnualReportPublications.aspx?Id=1377TataTrusts>. (2021). Telemedicine and AI in Rural Healthcare: Case Studies from Telangana. <https://tatatrusters.org/initiative/health/>

17. The Lancet Digital Health. (2020). "AI and telemedicine transforming healthcare access in India." [https://www.thelancet.com/journals/landig/article/PIIS2589-7500\(20\)30088-1/fulltext](https://www.thelancet.com/journals/landig/article/PIIS2589-7500(20)30088-1/fulltext)

18. Times of India. (2022). "AI improving education outcomes in Tamil Nadu." <https://timesofindia.indiatimes.com/city/chennai/ai-helping-schools-improvelearning/articleshow/>

19. UNESCO. (2021). Digital Education and AI in India: Case Studies. <https://unesdoc.unesco.org/ark:/48223/pf0000374557>

20. World Bank. (2022). AI and Digital Education in India: Improving Learning Outcomes. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/>

21. World Bank. (2023). Digital dividends: Transforming work through digital technology in India. [<https://www.worldbank.org/en/topic/digitaldevelopment/publication/digital-dividends>] (<https://www.worldbank.org/en/topic/digitaldevelopment/publication/digital-dividends>)

22. World Economic Forum. (2021). "AI driving financial inclusion in India's informal sector." <https://www.weforum.org/agenda/2021/07/ai-financial-inclusion-india/>.



Copyright & License:

© Authors retain the copyright of this article. This work is published under the Creative Commons Attribution 4.0 International License (CC BY 4.0), permitting unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.