Technology as a Catalyst for Viksit Bharat: Role of AI,5G and Digital Governance

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ABSTRACT

Investigating the transformative role of technology as a catalyst in achieving the vision of Viksit Bharat—a developed and self-sufficient India by 2047—is the aim of this study. This study examines how new technologies are altering the connection between the government and its citizens in addition to improving service delivery.

The study addresses how AI is enabling data-driven decision-making, predictive analysis, and personalized services, thereby transforming industries, healthcare, education, and agriculture. It emphasizes how India's AI mission is centered on inclusive, responsible innovation that supports rural development in addition to metropolitan areas. The influence of 5G technology, which is greatly increasing connection, facilitating real-time communication, and driving innovations like smart cities, telemedicine, virtual learning environments, and automation across industries, is also examined in this study.

Meanwhile, public service delivery is becoming more open, accessible, and citizen-centered thanks to digital governance platforms like Aadhaar, DigiLocker, CoWIN, UPI, and e-Government portals. Direct benefit transfers, paperless administration, and smooth communication between the public and the government are all made possible by these technologies. Notable case studies include CoWIN's superb management of the immunization campaign, DigiLocker's role in document accessibility, and UPI's achievement in promoting financial inclusion. These illustrations show how technology is enhancing governance on a large scale.

In accordance to this study, India is building a future-ready infrastructure that nurtures social inclusion, economic resilience, and digital empowerment as a result of the confluence of AI, 5G, and digital governance.

INTRODUCTION (About Viksit Bharat)

India, a country with a rich past, a varied culture, and a vast amount of untapped potential, is about to embark on a revolutionary journey to become a Viksit Bharat.The goal of the current government's plan, "Viksit Bharat 2047," is to fully develop India one hundred years after independence. Rapid advancement requires an understanding of and ability to use both domestic and global trends, which the Indian government and its people can use to raise their standard of living.

The goal is to be among the top three economies by 2047. A "developed" nation is typically defined by a number of factors, such as a high GDP per capita, low poverty rates, advanced infrastructure, universal healthcare and education, technological innovation, and strong institutions.

Technology is going to be really significant. From 5G networks to Artificial Intelligence and Digital India, technology will determine the future. The goal is to ensure that even villagers can access government services online, that students can learn on digital platforms, and that businesses can grow more quickly using digital tools. In many ways, technology connects the smart India of today to the India of the future.

Urban governance, education, agriculture, and public service delivery are all utilizing technologies like 5G, blockchain, artificial intelligence (AI), and the Internet of Things (IoT). Innovation has the potential to overcome systemic obstacles, as evidenced by the increasing use of digital systems like Aadhaar, DigiLocker, and UPI.

If a country's population are unhealthy, it cannot claim to be advanced. As a result, organizations such as Ayushman Bharat were established to provide disadvantaged families with free healthcare services. At the same time, emphasis is being placed on mental health, cleanliness, safe drinking water, and nutrition. However, progress should not come at the expense of nature. India is already addressing climate change through efforts such as Mission LiFE, which encourages individuals to adopt ecologically friendly activities such as reducing plastic consumption, conserving water, and saving electricity.

Effective governance is equally crucial. A developed India is one in which people feel heard, corruption is minimal, and government services are freely available. To shift governance online, a lot of work is being done for this reason. Many services are now available online, such as ration cards, scholarships, and even legal assistance. Time is saved, equity is guaranteed, and systemic and human trust is increased.

Given that India is one of the youngest nations in the world, this goal is crucial. We are full of promise, with more than 65 percent of the population under 35. However, potential needs to be shaped, directed, and fostered; it is not enough on its own. The dream of Viksit Bharat would become a reality if all young Indians had access to opportunities, healthcare, and education. However, we must acknowledge that progress is not limited to structures and businesses. It also involves togetherness, justice, compassion, and beliefs. In addition to becoming rich, we must build a nation where people are courteous, responsible, and kind.

1. Artificial Intelligence (AI) as a National Development Tool

Artificial intelligence (AI) refers to systems capable of learning, problem solving, and decision making—tasks that would typically need human intelligence. The application of AI for social good, especially in fields like healthcare and education, has been described in the National Strategy on Artificial Intelligence by NITI Aayog, which is part of the Indian policy landscape.

1.1. AI has introduced adaptive learning systems to education that adjust the way knowledge is delivered according to the speed and comprehension of the student. Individual performance data is evaluated by AI-powered solutions, which then provide tailored comments and suggestions. AI is also being utilized in curriculum design, automated grading, and multilingual translation, enabling regional inclusion in a linguistically diverse country.

1.2. AI significantly affects the healthcare sector's predictive diagnosis, imaging, electronic health record (EHR) administration, and public health surveillance. For example, AI models can detect early signs of diseases like diabetes mellitus, cancer, and tuberculosis by spotting patterns in imaging. AI-powered chatbots and virtual assistants are also increasingly supporting teleconsultations, especially in distant areas.

One of the most famous examples is the employment of AI-enabled diagnostic technology in government hospitals to detect diseases such as diabetic retinopathy, breast cancer, and tuberculosis early on. These tools significantly reduce diagnosis time and human error by evaluating X-rays, retinal scans, and other medical images and highlighting issues for further doctor evaluation.

For example, an AI-powered platform developed by Indian health tech startup Qure.ai is being used in partnership with state governments (including Maharashtra and Bihar) to do automated chest X-ray screening for tuberculosis. In locations where radiologists are in short supply, the system's capacity to evaluate scans in seconds and highlight suspicious cases for immediate referral is critical.

Similar to this, Google's AI-based retinal scanning technology, developed in collaboration with Aravind Eye Hospital, is being evaluated for inclusion in India's Ayushman Bharat Digital Mission. It has shown remarkable accuracy in identifying diabetic retinopathy.

These AI systems are meant to serve as efficient decision-support tools, not to take the position of medical professionals. AI holds promise for improving early intervention, reducing physician workloads, and expanding outreach in remote areas, according to the National Health Authority.

1.3. AI in Agriculture: Soil Health and Crop Advisory Tools

AI is also playing a significant part in enhancing Indian agriculture, which employs approximately 60% of the rural population. AI is being utilized to boost farm output, monitor soil health, and promote sustainable agricultural practices as part of the Viksit Bharat initiative.

One important use is AI-based soil analysis tools, which employ satellite data, machine learning models, and mobile app inputs to monitor soil quality, moisture levels, and nutrient shortages. For example, CropIn's Smart Farm platform employs AI and remote sensing to provide farmers with real-time soil and weather monitoring as well as customized crop advisories based on the condition of their field.

Another effort is the AI4AI project (Artificial Intelligence for Agriculture in India) of ICAR, which uses data from the Indian Council of Agricultural Research and AI models to give farmers advice on crop planning and fertilizer recommendations tailored to their soil.

Farmers with poor levels of literacy can profit from these technologies, which are often accessible through smartphone apps in local languages. By reducing the overuse of pesticides and fertilizers, the tools not only boost output and save input costs, additionally they also encourage environmentally sustainable behaviour.

2. 5G as a Catalyst for Viksit Bharat

The introduction of 5G technology is an important turning point in India's digital revolution, and it is critical to achieving the government's Viksit Bharat goal by 2047. 5G, the fifth-generation wireless standard, provides extremely low latency (as low as 1 millisecond), ultra-fast data throughput (up to 10 Gbps), and the ability to connect a large number of devices simultaneously. These skills facilitate the digital transformation of essential industries such as manufacturing, public services, healthcare, education, and agriculture.

By encouraging the integration of modern technologies like artificial intelligence (AI), the Internet of Things (IoT), robotics, and data analytics, 5G enhances service efficiency and reach in both urban and rural India. According to Ericsson's Mobility Report (2023), India will have more than 700

million 5G subscribers by 2028, and the Department of Telecommunications projects that 5G would boost the country's GDP by more than $450 billion by 2040. These numbers highlight the significance of 5G as a strategic infrastructure layer for national development as well as a telecom upgrade.

Importantly, 5G additionally encourages digital inclusion. It ensures that traditionally underserved communities have access to modern digital services by offering high-speed internet even in rural and remote areas. This highlights how 5G is serving as a revolutionary accelerator for fair growth under the Viksit Bharat program, and it coincides perfectly with India's ambitions to become a knowledge-based economy.

2.1. Role of 5G in Education

Inequalities in access, facilities, and quality, particularly between rural and urban areas, have long plagued India's educational system. By transforming the way education is delivered, accessed, and experienced, 5G has the potential to solve these problems.

Students in rural areas may now access virtual classrooms in real time thanks to 5G's high-speed and low-latency connectivity, which eliminates buffering and signal losses while enabling live lectures, workshops, and interactive sessions. It promotes the use of cloud-based learning platforms that can swiftly provide large volumes of content, improving accessibility to digital textbooks, tutorials, and reference resources.

The usage of virtual reality (VR) and augmented reality (AR) in the classroom is another key advancement brought about by 5G. When 5G networks become available, students will be able to participate in immersive learning experiences such as 3D historical tours, virtual scientific labs, and simulated engineering workshops. It is hoped that the shift from traditional rote learning to experience learning will significantly boost student engagement and retention of the subject.

In addition, 5G enables personalized learning. AI-powered educational apps now guarantee better learning outcomes by providing individualized content based on a student's performance, learning preferences, and speed. 5G-powered video conferencing and remote workshops improve the effectiveness and scalability of teacher training programs.

An important illustration of the impact of 5G on education is Airtel's partnership with Nokia to set up 5G-enabled smart classrooms in Andhra Pradesh and Nagaland. Through the use of VR technology and digital whiteboards in government schools, these pilot projects raised student engagement and curiosity in the classroom. In line with the Viksit Bharat objective, 5G is undoubtedly becoming a tool for educational empowerment, contributing to creating a proficient and educated youth population.

2.2. Role of 5G in Healthcare

Some of the current issues affecting India's healthcare system include unequal distribution of healthcare facilities, an availability of qualified professionals in rural areas, and a growth in the prevalence of noncommunicable diseases. 5G addresses a number of these issues by enabling data-driven, remote, and real-time healthcare delivery.

The use of 5G in telemedicine is one of its most obvious benefits. Doctors in remote places may provide continuous, high-definition video consultations to patients thanks to incredibly fast connectivity and low latency. This significantly lowers the need for travel and enables patients to obtain professional care wherever they are.

Autonomous artificial operations are another cutting-edge use. 5G, however still in its infancy in India, makes it technically possible for surgeons in urban areas to direct or operate robotic arms used in small-town hospitals to do surgery. Access to cutting-edge surgical care could be greatly improved nationwide because to this invention.

Furthermore, 5G makes it possible for IoT-enabled medical devices to be adopted for ongoing patient monitoring. Smart beds and wearable health monitors can automatically collect and transmit patient vitals to healthcare providers in real time, leading to better treatments and better medical results.

Another area where 5G improves efficiency is the rapid and secure transfer of large medical files such as MRI scans, pathology reports, and X-rays. Rapid data exchange improves therapy decisions and improves diagnosis accuracy.

Airtel and Apollo Hospitals executed a significant experiment in which 5G-enabled mobile health vans could immediately connect to rural specialists. Doctors could provide fast advice or referrals thanks to the diagnostic devices in these vans, which communicated patient data over the 5G network. This idea highlights how 5G can assist India reach its public health goals under the Viksit Bharat plan by providing high-quality healthcare to even the most remote corners of the country.

With Reliance Jio and Bharti Airtel at the forefront, India has advanced significantly in 5G deployment since its commercial launch in October 2022. With the development of a standalone (SA) 5G architecture that functions separately from the 4G network, Reliance Jio has taken the technological lead. Jio can offer improved coverage, faster speeds, and incredibly low latency as a result. More than 96% of Indian towns and cities would be covered by Jio's more than 115,000 5G towers by the middle of 2025, according to RCR Wireless. Jio recently unveiled JioAirFiber, a fixed wireless access (FWA) service that offers homes high-speed internet without the need for fibre connections. This service is especially helpful in hilly and rural areas. There are roughly 4.26 lakh active users at the moment.

Furthermore, Jio has successfully built India's first totally domestic 5G stack and filed over 350 patents covering 5G and 6G technologies, confirming its independence in telecom innovation. Jio also tested 5G-enabled linked ambulances in cooperation with Hiranandani Hospital, exhibiting life-saving use cases like as sending real-time vitals to hospitals while patients were in transit.

After initially opting for a non-standalone (NSA) 5G network, Bharti Airtel has swiftly extended its reach over all 22 telecom circles. Airtel worked with Nokia and Ericsson to upgrade its network backbone, and by 2025, it had more than 50 million 5G users. Airtel has focused on vertical 5G applications, establishing sectoral adoption milestones through partnerships with Apollo Hospitals for rural healthcare delivery and Northeast educational institutions for smart classrooms.

By deploying 5G for energy optimization, traffic management, surveillance, and digital public services, Jio and Airtel additionally contributed to India's smart city aspirations. In addition to expanding network infrastructure, their substantial investments and key partnerships are encouraging innovation, entrepreneurship, and digital empowerment throughout India.

3. Digital Governance

The Indian government has established a strong Digital Public Infrastructure (DPI) as part of the Digital India Mission, which includes platforms such as Aadhaar, UPI, Digi Locker, Co-WIN, and India Stack. To ensure that digital services reach the final mile, these technologies are designed to be inclusive, scalable, and interoperable. India is not only adopting digital governance, as Prime Minister Narendra Modi eloquently emphasized, but it has also established international standards in this area.

The way Indians keep and transmit their official documents has been gradually but profoundly changed by Digi Locker. As part of the Digital India Mission, Digi Locker was introduced in 2015 to achieve paperless governance. But as time went on, it became much more: a representation of the digital trust between people and governments.

The core of Digi Locker is a cloud-based digital vault connected to Aadhaar that allows official papers to be issued, read, and shared rapidly for every Indian citizen. DigiLocker stands out because these documents are more than merely digital scans; they are digitally signed and legally binding by over 2,500 government and autonomous authorities, including the Transport Department, CBSE, UIDAI, and others.

As of 2024, over 43 crore people have enrolled in Digi Locker, and the service has given more than 9.4 billion digital documents. These include health records, income tax forms, school certificates, car registrations, and even insurance plans. According to a 2022 NITI Aayog report, the introduction of Digi Locker reduced document verification times by more than 70% in a variety of administrative operations, particularly among state recruitment boards and colleges.

The platform reduces long queues, paperwork, and unnecessary middlemen by connecting with Aadhaar and e-KYC to give instant identification verification. Furthermore, there is no dispute regarding the documents' legitimacy because they are promptly provided by reputable government databases. This has been particularly beneficial in combating document theft in domains such as employment and public distribution.

The success of Digi Locker has sparked international attention. Several countries, including the UAE and Singapore, have expressed interest in adopting or developing comparable platforms, emphasizing India's position as an international innovator in citizen-centric digital government. Digi Locker's journey demonstrates the spirit of Viksit Bharat, which envisions a self-sufficient, digitally empowered India where no citizen is left behind. It makes life easier, reduces costs, fosters trust, and strengthens the relationship between the government and its citizens, not through bureaucracy, but through smart, transparent, and easily available technology.

3.1. UPI: Driving Financial Inclusion and a Cashless Economy

One significant instrument in digital governance is India's Unified Payments Interface (UPI). The National Payments Corporation of India (NPCI) developed UPI, which was introduced in 2016 and allows for real-time money transfers between bank accounts using a mobile device. Peer-to-peer and merchant payments are made possible without the need for physical cards or currency.

With an average of more than 10 billion transactions each month, UPI recorded 131 billion transactions totalling more than ₹180 lakh crore in FY 2023–2024. These numbers demonstrate how widely accepted the platform is in India's cities and countryside. Millions of citizens who were previously shut out of the traditional banking system, such as small traders, farmers, and street vendors, now have access to financial services because of UPI.

One of the key benefits of UPI is the ability to transfer and receive money between banks via apps such as Phone Pay, Google Pay, Paytm, and BHIM. The open architecture promotes efficiency, creativity, and competition. UPI's support for features such as overseas remittances, credit-linked payments, and auto-payments strengthens India's economic ecosystem even further.

Above important, UPI ensures transaction transparency and traceability, making it a useful tool for preventing funds from leaking out of government programs and subsidies. It also contributes to DBT (Direct Benefit Transfer) programs by allowing for the instant credit of subsidies into beneficiaries' accounts. Under the Viksit Bharat framework, UPI has shown to be a critical component in establishing a paperless, corruption-free, and technologically advanced economy.

3.2. Co-WIN –India's Digital Vaccine Shield

In addition to becoming a health calamity, the COVID-19 pandemic posed a massive logistical challenge: how to rapidly and properly vaccinate over a billion people while ensuring safety, effectiveness, and equity? This task could have easily collapsed under its weight in a country as large and diverse as India. Co-WIN, India's COVID-19 Vaccine Intelligence Network, provided the technological underpinning that not only enabled this but also executed it at unprecedented scale and speed.

Co-WIN, which was introduced by the Ministry of Health and Family Welfare in January 2021, was more than just an app or website. The largest immunization campaign in history was planned by a digital command center. Through online registrations, real-time slot reservations, inventory tracking, and the creation of secure digital certificates, Co-WIN managed almost 2.2 billion vaccination doses by the middle of 2023. The legacy of Co-WIN now goes well beyond COVID-19. Under the Universal Immunization Programme (UIP), the government has suggested growing the routine vaccination platform and combining it with the Ayushman Bharat Digital Health Mission (ABDM). India's digital maturity has been demonstrated by the evolution of Co-WIN from a crisis response tool to a long-term cornerstone of digital health governance**.**

Co-WIN demonstrated that, even in times of fear and uncertainty, technology, when developed with empathy and scale, can bring optimism, coordination, and outcomes. It became not simply a platform, but a symbol of collective resilience and India's journey to Viksit Bharat.

3.4. India's Digital Governance Ecosystem and Its Global Impact

The digital governance concept in India encompasses more than just these three platforms. The larger ecosystem consists of:

• Aadhaar, which gives more than 1.35 billion Indians a digital identity that facilitates welfare delivery, e-KYC, and subsidy tracking.

•Through local business owners, Common Service Centres (CSCs) provide over 300 financial and governmental services at the village level.

•By enabling even tiny merchants to take part in the online economy, ONDC (Open Network for Digital Commerce) democratizes e-commerce.

• Bhashini, an AI-powered translation tool that encourages digital participation throughout the linguistically varied country of India

Collectively, these platforms reflect India's commitment to building a "digital state" that is inclusive, effective, and transparent. India is now exporting its Digital Public Infrastructure (DPI) model to other developing countries, showcasing how governance can be redefined through open, scalable technology.

4. India's Technological Achievements on the Path to Viksit Bharat

4.1. Smart Healthcare- The AI, 5G, and Digital Governance Mode

Digital governance platforms such as Co-WIN and ABHA (Ayushman Bharat Health Account) safeguard electronic health records in the healthcare business. 5G has enabled rural health institutions and hospitals to connect with super-specialty hospitals for robotic surgery, remote diagnostics, and real-time telemedicine.

Furthermore, AI systems examine medical records to identify high-risk individuals, spot trends in disease outbreaks, and aid in diagnosis (for example, tuberculosis, cancer, diabetic retinopathy). The three-tiered system facilitates data-driven, preventive public health governance.

For example, a rural health professional can utilize a 5G-enabled smartphone app to upload a patient's chest X-ray, which an AI tool can quickly evaluate for tuberculosis. The case is instantly recorded into the national system, a follow-up visit is scheduled, and the patient is sent a text message with treatment reminders**.**

4.2. Agriculture – Smart Farming Meets Smart Policy

Farmers in India endure unpredictable weather, soil degradation, and market volatility. Here's where AI, 5G, and governance come together to give a breakthrough.

• AI systems forecast crop variety, insect issues, and weather patterns using historical data and satellite imagery.

• Real-time information on crop health, irrigation requirements, and soil moisture is provided by field-based 5G-enabled IoT sensors.

• Farmers' cell phones receive information on schemes, market prices, and subsidies straight from digital systems like eNAM and PM-KISAN.

By transforming farming from intuition to evidence-based agriculture, this technological stack empowers farmers and enables governments to offer targeted, effective assistance.

4.3. Education- Smart Learning for a Smarter Bharat

The National Education Policy (NEP 2020) prioritizes equality, adaptation, and online education. Here's when convergence becomes critical.

• DIKSHA and SWAYAM are digital governance platforms that offer national access to digital content and teacher training.

• 5G technology enables AR/VR classrooms, high-resolution video lectures, and real-time collaboration, especially in rural areas.

• AI algorithms personalize learning by adjusting to students' pace, language, and comprehension.

4.4. Governance

Traditional governing systems respond to challenges. However, when AI, 5G, and digital governance combine, governments can foresee problems and address them in real time:

• 5G enables faster notifications, AI identifies seismic activity, and citizens receive alerts via mobile applications, SMS, and DigiLocker.
• 5G improves response times, while AI chatbots on MyGov and State portals prioritize concerns.

• Smart cities improve urban living by controlling traffic, pollution, and water use with AI-processed data from 5G sensors.

This integration assures that governance is no longer about paperwork, delays, or manual oversight, but rather proactive, intelligent, and citizen-focused.

4.5. International Recognition and India's Leadership in Digital Innovation

Other countries are currently studying and implementing India's digital infrastructure model. Nations across Asia and Africa have been offered platforms such as UPI and Co-WIN. Global forums, including the G20, World Economic Forum, and the IMF, have praised India's DPI for being inclusive, open-source, and scalable.

The India AI Mission, Digital India 2.0, and the National 5G Mission all demonstrate the country's commitment to integrated digital transformation, not just for economic growth but also for fair development, as outlined in the Viksit Bharat plan.

CONCLUSION

India's ability to successfully use modern technology into government and public service delivery is closely tied to its goal of Viksit Bharat @2047. This study has shown how citizens' interactions with the government and access to essential services are being drastically altered by the convergence of artificial intelligence (AI), 5G connectivity, and digital governance.

India is becoming a global leader in digital transactions because to platforms like the Unified Payments Interface (UPI), which provide inclusive, safe, and real-time financial systems that connect millions of individuals daily from urban centers to isolated rural areas. By providing citizens with secure, cloud-based access to government-issued documents, DigiLocker has eliminated paperwork, reducing red tape and boosting productivity.

The CoWIN platform, meanwhile, demonstrated India's capacity to scale up technology-driven solutions, efficiently and accurately overseeing one of the biggest immunization campaigns in the world.

By enhancing decision-making, automating repetitive processes, evaluating public feedback, and offering individualized services in the fields of healthcare, education, and agriculture, artificial intelligence is currently being applied across industries to improve governance. However, 5G connectivity actively closes the digital divide by ensuring that these technologies are delivered with ultra-low latency, reaching even the most remote and underserved corners of the nation.

A new era of data-driven, accountable, transparent, and citizen-centered governance is being set in by these technologies taken together. They aid in the removal of inefficiencies, the decrease of corruption, and the delivery of quicker, more equitable, and more inclusive services. Crucially, they give citizens more agency, access, and dignity when interacting with the government.

A strong foundation for a tech-enabled future has been established by India's continuous investments in digital innovation, talent development, and public-private cooperation, even though issues like digital literacy, data security, and infrastructure shortages still need to be resolved.

Lastly, technology promotes India's development in addition to supporting it. Digital governance, 5G, and AI are working together to make India a more independent, inclusive, and competitive country in the world. Thanks to clever implementation and citizen-first innovation, the vision of Viksit Bharat is now very much within reach.

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