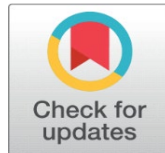


DIGITAL INDIA IN 21ST CENTURY: CHALLENGES AND OPPORTUNITIES

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ABSTRACT

The 21st century shows an era of unprecedented digital transformation, positioning India at the edge of a technological revolution with its ambitious "Digital India" initiative. This article deals with the multifaceted landscape of Digital India, exploring the profound challenges and abundant opportunities it presents. By aiming to create a digitally empowered society and knowledge economy, the initiative strives to bridge the digital divide, enhance e-governance, and foster economic growth through digital inclusion. Key challenges such as infrastructural inadequacies, cybersecurity threats, digital literacy deficits, and regional disparities in access to technology are critically examined. The article also addresses the complexities of implementing large-scale digital projects in a diverse and populous country like India. Conversely, the opportunities presented by Digital India are vast. The initiative has the potential to revolutionize various sectors, including healthcare, education, agriculture, and finance, through the integration of digital technologies. It promises to enhance efficiency, transparency, and accessibility, thereby driving socio-economic development. The rise of a robust digital ecosystem can promote innovation, entrepreneurship, and job creation, positioning India as a global digital leader.

This research paper provides a comprehensive analysis of the strategic measures needed to overcome the challenges and leverage the opportunities inherent in Digital India. Through case studies, policy analysis, and stakeholder perspectives, it offers insights into the path forward for realizing the vision of a digitally empowered India in the 21st century. By balancing the discourse between potential hurdles and strategic opportunities, this research paper aims to contribute to the ongoing dialogue on India's digital future.

Keywords: Digital India, Digital Literacy, Digital Infrastructure, E-Governance, Cyber Security, Digital Economy



1. INTRODUCTION

Recently India celebrated its *Azadi ka Amrit Mahotsav* on its 75th year of Independence and now India aspires to become a developed nation by 2047 through its *Viksit Bharat Abhiyan* under Vision@2047, where we aspire to join the leading group of developed nations of the world. For achieving this dream, ensuring inclusive growth and development of the nation is an essential requirement. This inclusive growth and development can be achieved through financial inclusion, e-governance, technological assistance and smooth administration. All these functionalities or parameters can be best achieved by utilising the power of digital

technology, where we can foster the growth rate and development through online administration and thus ensuring optimum utilisation of the available resources and thereby decreasing the leakages in the economy. However, ensuring the digital transformation in a country like India with nearly 140 crores population and diverse geographical and demographic features will not be an easy task and for implementing this, huge amount of capital investment will be required and also investment in human resource development for digital literacy would be required. Apart from these infrastructural issues, cyber security and cybercrime cases are increasing day by day, causing a severe threat to digitisation leading to huge financial loss to the citizens particularly the rural population, and due to being digitally unaware, they are not even able to report the same to the concerned authorities for its redressal, so it has now become a major challenge for the smooth implementation of the program.

In the recent years, we have seen various concerns like Deepfakes, Artificial Intelligence related frauds, causing socio-economic losses both to an individual as well as the society. Under the Digital India program, to effectively harness its potential Innovation and Research and Development in these field is also required, so as to make use of this technology in various areas like for providing effective healthcare facilities, implementation of New Education Policy - 2020, Societal Development, Good Governance, Inclusive Growth, etc. These changes can revolutionise the facilities being provided in these fields in such a way that these can contribute to the development of the nation so as to improve the India's position in various global parameters like Human Development Index (HDI Index), World Happiness Report, Transparency Index, Corruption Index, Sustainable Development Goals (SDGs), Global Emission Targets, etc. and can be helpful to enhance the India's impact in the global scenario.

So, in this article we will analysing the current status of digitisation in India, the challenges being faced and probable ways to address those challenges, so as to harness the potential of digital technology for the development of the nation.

2. REVIEW OF LITERATURE

[Dar and Nagrath \(2022\)](#) have found that, the Digital India Campaign aims to develop a robust digital infrastructure, enhancing business digitalization, agricultural GDP, industrial competitiveness, and payment systems. Despite challenges like illiteracy and poverty, the campaign seeks to transform underdeveloped regions and reduce unemployment, envisioning a fully digital India by 2025 and fostering national development. [Bjawa \(2022\)](#) in his study found that, India's economy grew by 7.3% in 2015, bolstered by the Digital India initiative. The GDP increased to Rs 106.4 trillion from Rs 99.21 trillion in 2013-14. The campaign is set to create 17 million jobs and provide IT training to 100 million students, enhancing sectors like health, defense, and education. With broadband and mobile connectivity improvements, the initiative aims for economic development and reduced imports by 2020. [Haldankar \(2018\)](#) in his study mentioned that, the vision of Digital India is transformative, aiming to empower the nation by providing access to multimedia information, content, and services. Despite vast opportunities, significant challenges remain in implementing its nine pillars. Focused and persistent attention is crucial for success. Citizens must mentally prepare for this change and embrace the challenges to make this vision a reality. [Shallu et al. \(2019\)](#) have found in their study that, the digitalization brings innovation, job opportunities, and economic growth by enhancing transparency and reducing tax evasion. For success, it requires both availability and knowledge of technology. The

Digital India initiative aims to transform India into a digitally empowered society. Despite challenges, it promises significant impact, leveraging India's vast manpower for unprecedented growth and positioning the country alongside developed economies. [Shetty \(2019\)](#) has found that while most people are aware of the Digital India initiative, they lack knowledge about its specific details and services. There is significant potential to increase youth participation for the initiative's success, and the government should focus on spreading awareness.

3. RESEARCH GAP

Although the Digital India initiative has been widely studied for its potential to transform India into a digitally empowered society, existing research has often been broad and outcome-focused. Most studies have emphasized macroeconomic impacts such as GDP growth, sectoral improvements, and infrastructural achievements [Dar and Nagrath \(2022\)](#), [Bjawa \(2022\)](#). However, limited academic attention has been paid to the operational challenges that persist at the grassroots level. These include infrastructural deficiencies in remote areas, inadequate digital literacy programs, rising cybersecurity threats, and a persistent urban-rural digital divide. Moreover, while anecdotal and statistical evidence exists, few studies have empirically assessed how these challenges hinder the inclusive success of the initiative across sectors like healthcare, education, agriculture, and e-governance. This research seeks to address these overlooked dimensions, offering a comprehensive analysis of both achievements and shortcomings.

4. OBJECTIVES OF THE STUDY

- 1) To assess infrastructural and educational constraints in the implementation of the Digital India programme.
- 2) To evaluate the sector-specific impact of Digital India in areas such as education, healthcare, agriculture, and governance.
- 3) To examine the effectiveness of digital literacy initiatives like PMGDISHA in narrowing the digital divide.
- 4) To identify key policy and technological strategies for overcoming implementation challenges such as cyber threats and fund constraints.

5. RESEARCH METHODOLOGY

Nature of the Study: Descriptive Study

1) Types of Data: Secondary Data

2) Data sources: Secondary data has been collected through various sources

- Official dashboards and databases from the Ministry of Electronics and Information Technology (MeitY).
- BharatNet project progress reports and CSC (Common Services Centres) deployment data.
- Program-specific statistics from PMGDISHA and DigiLocker portals.
- Government press releases and fiscal reports (e.g., PIB, Ministry of Finance).

3) Period of the Study: The analysis focuses on a five-year period, spanning from 2019-20 to 2023-24.

4) Data Analysis: Graphical and tabular analysis.

6. DIGITISATION AND DIGITAL INDIA PROGRAM

Now let us discuss what the digitisation is and what does the Digital India mean, *Digitisation* refers to the process of converting information into a digital format, typically using computer and electronic devices. This process involves converting analogue data (like physical documents, images and sounds) into digital form which can be processed, stored and transmitted more efficiently.

In the similar way, *Digital India in 21st Century* is all about utilising this process of digitisation to ensure that government services are made available to the citizens electronically by improving online infrastructure and by increasing internet connectivity.

The key components of the Digital India are:

- 1) Digital Infrastructure: Broadband, High-Speed Internet in rural areas
- 2) Governance and Services on Demand
- 3) Digital Empowerment of Citizens
- 4) Universal access to Mobile connectivity
- 5) Public internet access program: CSCs (Common Service Centres)

Overall, Digital India aims to transform India into a digitally empowered society and knowledge economy by leveraging digital technologies for inclusive growth and is having a lot of opportunities in various sectors.

7. OPPORTUNITIES THROUGH DIGITAL INDIA IN VARIOUS SECTORS

By harnessing the power of Digital India program, we can see a lot of opportunities related to it in various sectors, which are

1) Education –

- It provides access to quality education without the limitations of geographical boundary from any location.
- During COVID-19 era, it proved to be a boon for maintaining the pace of education through online classes.

2) Healthcare –

- Tele medicine and remote consultation via online media helped the citizens to avail medical facilities in the regions where physical health infrastructure is unavailable.
- Initiatives like the PMJAY (Pradhan Mantri Jan Aarogya Yojana), ABHA(Aayushman Bharat) with integration to online system helps to avail cashless medical facilities.

3) Agriculture –

- Agriculture is the backbone of Indian rural population, Digital India helps farmers to provide information about weather forecast, market practices, best agricultural practises enhancing productivity and income.
- Mobile applications like Meghdoot, e-NAM, M-Kisan, Farm-o-pedia, Pusa Krishi, etc. have proved to be very useful to the farmers.

4) Business and Industry –

- Digital marketing tools, accessing e-commerce, accessing global markets and target citizens have become much easier with the adoption of digital channels. Example includes: OLA, Uber, Zomato, Amazon, Flipkart etc.
- Banking Services have been revolutionised through Digital India program. Like Internet Banking Facilities, YONO SBI etc.
- Industrial compliances have also been streamlined through implementation of e-Waybill, Online GST returns, Single Window System for various approvals.

5) E-Governance –

- One of the major impacts of Digital India is the E-governance for enhanced transparency, credibility and record keeping of government services.
- JAM Trinity (Jandhan Adhaar Mobile), e-FIR through new criminal justice bills, single window system, e-RTI filing are some of its examples.

8. CURRENT STATUS AND INITIATIVES UNDER DIGITAL INDIA PROGRAMME

The current status and various initiatives under the Digital India Program by the Government can be seen under the following heads:

Infrastructure

As per data provided by Telecom Service Providers and field units of Department of Telecommunications, it is estimated that out of 5,97,618 inhabited villages (as per Census 2011) in the country, 5,58,537 villages have mobile wireless broadband coverage. [Press Information Bureau \(2022\)](#)

Table 1

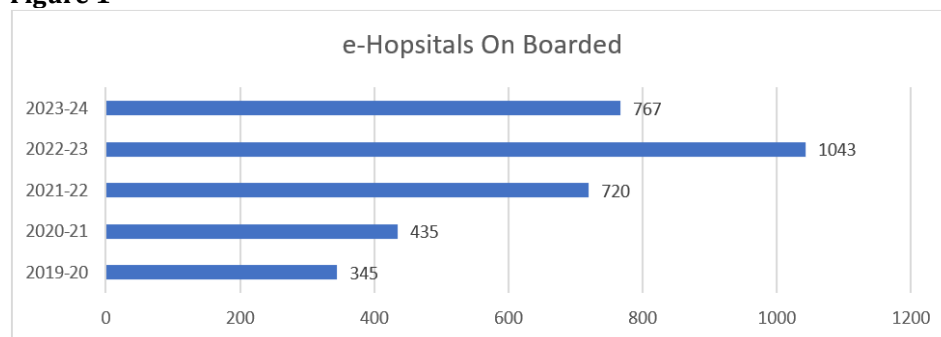
Inhabited Villages	5,97,618
Villages having Mobile Broadband Connectivity	5,58,537
Percentage Coverage	93.46%

In addition to this, BharatNet project is envisaged in all the Gram Panchayats (GPs) and villages of the country to provide high speed internet/broadband. As on 28.02.2022, a total of 1,72,361 Gram Panchayats have been made service ready in the country with broadband infrastructure under BharatNet. [Press Information Bureau \(2022\)](#)

Table 2

Bharat Net Project Status as on 28.02.2022	Column1
No. of Gram Panchayats Covered	1,72,361

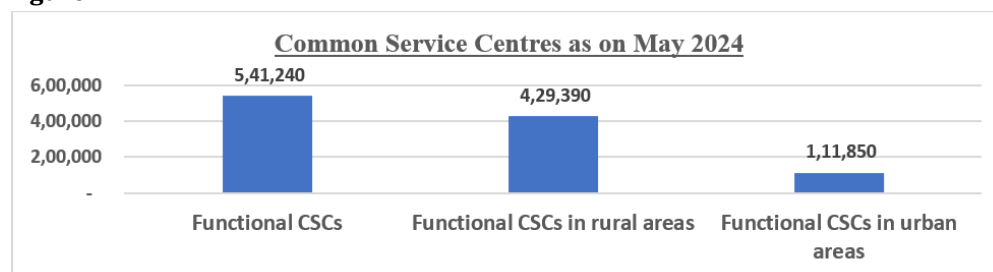
The graph below shows the yearly on boarding of the hospitals for providing hassle free access to healthcare services, which shows that the numbers have increased significantly.

Figure 1

Source: Dashboard, Ministry of Electronics and Information Technology

9. COMMON SERVICE CENTRES STATUS

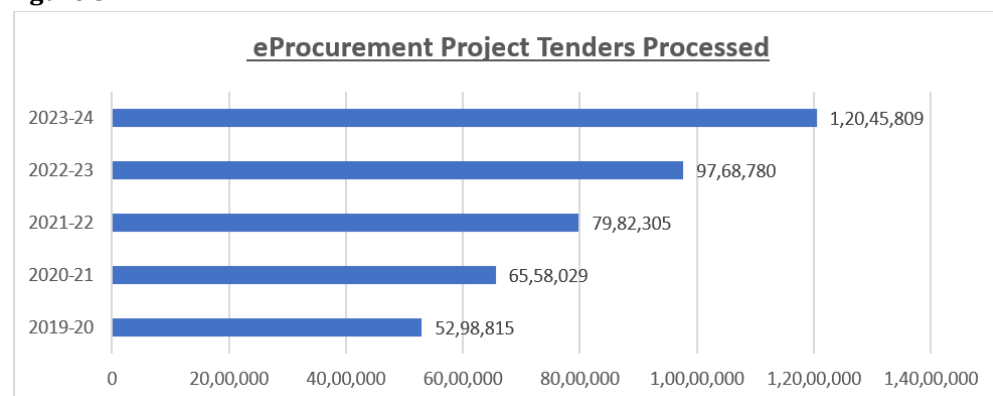
The below data shows the numbers of functional Common Service Centres as on May 2024, so far 4,29,390 functional CSCs have been installed to provide internet facilities in those areas.

Figure 2

Source: Common Service Centre website -<https://csc.gov.in/>

1) E-Governance Status

The below data shows that the number of tenders processed online have increased year after year, showing the effect of digitisation on governance.

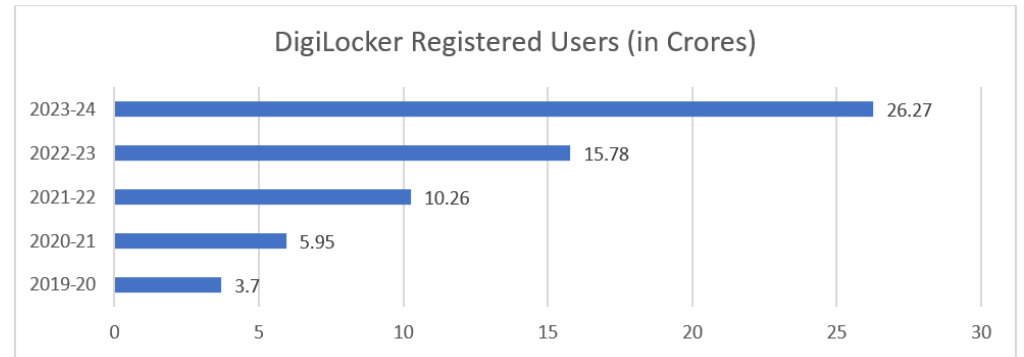
Figure 3

Source: Dashboard, Ministry of Electronics and Information Technology

The graph below shows the cumulative number of people registered for DigiLocker Facility, it shows that in the year 2019-20 only 3.7 crores registered

users were there which have in the year 2023-24 have significantly increased to 26.27 crores registered users.

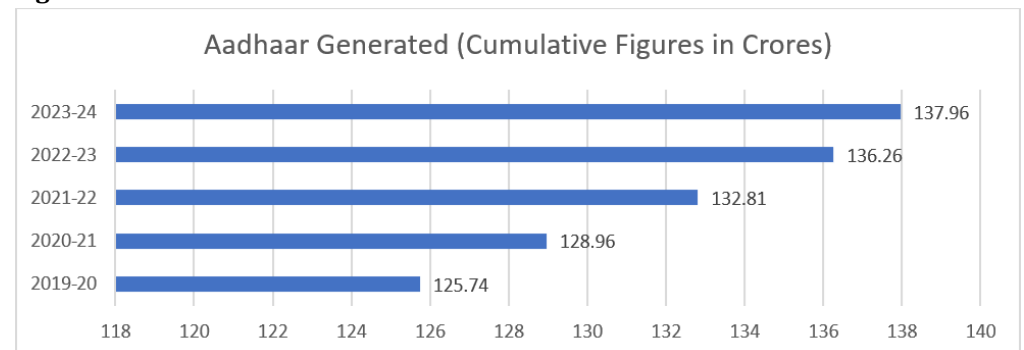
Figure 4



Source: Dashboard, Ministry of Electronics and Information Technology

The graph below shows that the number of Aadhaar generated have significantly increased from 125.74 crores in 2019-20 to 137.96 crores in 2023-24, which shows that the significance of Digital India on e-Governance.

Figure 5

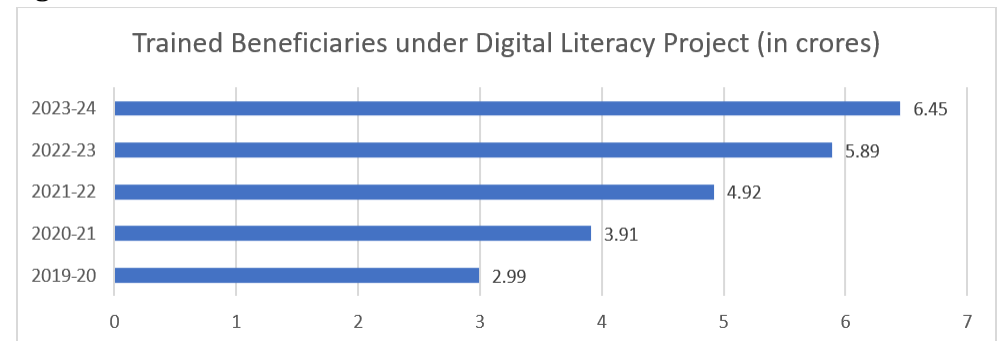


Source: Dashboard, Ministry of Electronics and Information Technology

2) Digital Literacy

The below data shows that the number of trained beneficiaries of Digital Literacy program have increased from 2.99 crores in 2019-20 to 6.45 crores in 2023-24.

Figure 6

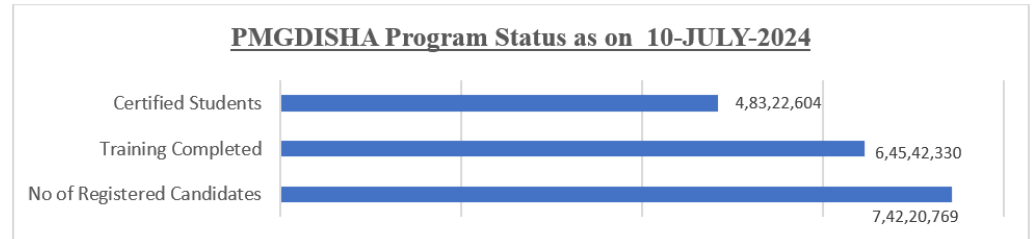


Source: Dashboard, Ministry of Electronics and Information Technology

Through PMGDISHA Programme – Pradhan Mantri Gramin Digital Saksharta Abhiyan with the aim of making one person in every family digitally literate is one of the integral components of the Prime Minister’s vision of “Digital India”.

It’s status as on 10-July-2024, shows that the total number of registered candidates under this is 7.42 crores, which shows its significance.

Figure 7



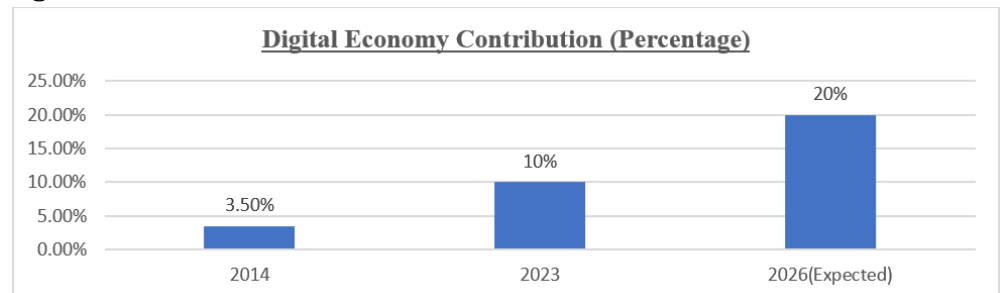
Source: PMGDISHA Website - <https://www.pmgdisha.in/>

3) Digital economy

As per the press release by Ministry of Electronics & IT dated 12-June-2023, it has been mentioned that,

“Previously when 100 rupees left Delhi for the benefit of the poor or benefit of a citizen only 15 rupees reached the citizen because the cost of governance, the cost of democracy was 85 rupees out of 100 rupees dispatched. Due to the power of DPI launched in 2015, that narrative about India the world’s largest country and democracy has transformed significantly where now 100 rupees leaves the state capital or central capital and 100 rupees reaches the benefit for the citizen whose benefit it is intended for. Over 400 billion dollars have been transferred from the government to the citizens of India over the last five years without any leakage and without any intimidation, that is the power of DPI and that is the power that India has demonstrated.”

Figure 8



Source: Press Release - Ministry of Electronics & IT (<https://pib.gov.in/>)

In this press release, it has also been found that the contribution of the Digital Economy to GDP of India was 3.5% in 2014, which rose to 10% in the year 2023 and is expected to grow upto 20% by the year 2026.

10. CHALLENGES

In the implementation of the Digital India Program, there are various challenges, which are being faced, becoming a major hinderance in its success. These are:

- 1) **Digital Divide:** In India, digital divide can be seen between rural and urban areas, as it is evident from the fact that the urban areas are more digitally inclusive and the rural areas are less digital inclusive. Also, between different geographical region, digital divide can easily be seen for example in more developed cities like the metro cities are more digitally inclusive but at the same time the regions with less accessibility and rough terrain can be seen to have less developed digital infrastructure.
- 2) **Cyber Security:** Data theft and cyber security threats pose a serious challenge towards implementation of Digital India program. A total of 3,719, 4,916, 5,461, 33,514, 70,798, 85,797, 54,314, 48,285 and 1,92,439 cyber security incidents related to government agencies, institutions and undertakings were observed during the years 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021 and 2022 respectively. Also, the banking frauds are increasing day by day [Ministry of Electronics and Information Technology. \(2014\)](#)
- 3) **Digital Literacy Awareness:** This is also among one of the major challenges that is being faced towards successful implementation of Digital India program. Digital literacy in rural and tribal areas is very low, due to which they are even not using the digital initiatives or whoever is using are getting affected by the cyber-attacks.
- 4) **Funds Availability for Digital Infrastructure:** For the development of digital infrastructure and conducting awareness programs huge capital investment will be required to bridge the gap of digital divide. As in the revised estimate for 2023-24, the government projected a fiscal deficit of ₹17.34 lakh crore, which is 5.8 per cent of the GDP. [Prasad \(2024\)](#) for investment in digital infrastructure more funds will be required and this will further increase the fiscal deficit affecting the financial health of India.
- 5) **Deepfakes:** Deepfakes pose a significant threat to Digital India's program by undermining trust in digital content, spreading misinformation, and potentially causing political and social unrest. Their impact could hinder the program's goal of creating a secure digital ecosystem.

These are the various challenges which needs to be addressed upon for successful implementation of the program.

11. RESULTS

The analysis of secondary data from government dashboards, policy documents, and program statistics reveals the following key findings:

1) Digital Infrastructure and Access

- As of 2022, approximately **93.46%** of India's inhabited villages had mobile broadband coverage [Press Information Bureau \(2022\)](#).
- **1.72 lakh Gram Panchayats** have been made service-ready under the BharatNet initiative, indicating significant progress in digital infrastructure deployment.

2) Digital Literacy and Inclusion

- Through PMGDISHA, **7.42 crore** candidates have registered, with **over 6.45 crore beneficiaries trained** as of July 2024.
- However, literacy penetration in tribal and remote regions remains suboptimal, contributing to continued digital exclusion and vulnerability to cyber threats.

3) Sectoral Transformation

- **Education:** The use of online platforms during COVID-19 and implementation of NEP 2020 shows a growing acceptance of digital modes of learning.
- **Healthcare:** e-Hospitals and telemedicine have grown steadily, improving service access in low-infrastructure zones.
- **Agriculture:** Apps like e-NAM and Pusa Krishi have gained traction, enabling informed decision-making among farmers.
- **Governance:** Use of e-FIR, DigiLocker (26.27 crore users), e-tendering, and Aadhaar registration (138+ crore) demonstrates successful service digitization

4) Cybersecurity and Trust Deficit

- Cybersecurity incidents have escalated sharply—from **3,719 in 2014 to 1.92 lakh in 2022**, creating a substantial trust barrier, especially in rural areas where reporting mechanisms and digital literacy are weak.

5) Digital Economy Growth

- The digital economy's contribution to India's GDP rose from **3.5% in 2014 to 10% in 2023**, with projections of **20% by 2026** [Press Information Bureau \(2023\)](#), indicating a strong correlation between digitization and economic performance.

12. CONCLUSION

The *Digital India* initiative represents a transformative step toward bridging India's socio-economic divides and accelerating inclusive development through digital means. Evidence from sectoral data and progress metrics confirms the substantial gains made in infrastructure expansion, service digitization, and economic participation. However, despite commendable advancements, core challenges persist in the form of regional digital divides, cybersecurity threats, funding constraints, and low digital literacy among rural and marginalized populations.

Successful realization of the *Digital India* vision—particularly in achieving Viksit Bharat@2047—requires addressing these structural gaps while maintaining momentum in innovation, policy reform, and stakeholder collaboration. The initiative, therefore, stands at a crucial juncture where overcoming its foundational challenges will determine its long-term sustainability and national impact.

13. SUGGESTIONS AND POLICY RECOMMENDATIONS

Based on the findings and analysis, the following recommendations are proposed:

1) Strengthening Infrastructure Access

- Accelerate **last-mile internet connectivity** using technologies like satellite internet, PM-WANI, and community Wi-Fi in tribal, hilly, and underserved regions.
- Ensure uninterrupted electricity and basic telecom services in rural areas to support digital initiatives.

2) Enhancing Cybersecurity and Legal Frameworks

- Establish **localized cybersecurity cells** and helplines to respond to digital frauds promptly.
- Update the **Information Technology Act, 2000** to address emerging threats like deepfakes and AI-generated misinformation.
- Promote mandatory **cyber hygiene training** at schools and panchayat levels.

3) Expanding Digital Literacy

- Scale the PMGDISHA initiative with **customized vernacular modules** and partnerships with local NGOs.
- Introduce **digital inclusion metrics** in district-level governance performance reports.
- Incentivize states to conduct **door-to-door digital awareness drives**, especially targeting older adults and women in rural areas.

4) Encouraging Public-Private Partnerships (PPP)

- Leverage PPP models to build cost-effective digital infrastructure and innovation labs in Tier 2 and Tier 3 cities.
- Encourage private investments in cybersecurity R&D and rural fintech innovations.

5) Monitoring and Evaluation

- Establish a **national digital audit mechanism** to track real-time progress of Digital India programs at micro levels.
- Include **impact indicators** such as service delivery efficiency, citizen satisfaction, and economic empowerment in program evaluations.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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