

Rural Governance Meets AI: Bridging the Digital Divide for Sustainable Service Delivery in India

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ABSTRACT

AI and Rural governance can be used to overcome the digital divide and to provide public services to remote areas in India, especially to the rural population. AI has the potential to bridge the technology gap and enhance public services in rural areas, overcoming the digital divide and making AI a game-changer in India. This paper addresses the interdependencies and multifaceted effects of AI technologies with different rural governance structures in India's socio-economic context. This paper aims to look at the status of digital infrastructure in rural India, explore the AI-based governance efforts, map the results of these efforts in terms of citizens' empowerment, citizens' inclusiveness, and the effectiveness of service delivery, and analyze the state of digital infrastructure in rural India based on secondary data sources from government reports, peer-reviewed studies, and policy documents. It also outlines systemic issues like a lack of digital literacy in rural areas, infrastructure gaps, algorithmic bias, and data privacy concerns that hinder the potential of AI in rural areas. This is a comparative, state-based study. The results show that while there exist structural inequities in the application of AI in the rural context in India, there are also improvements that can be seen in the flagship schemes such as eSanjeevani, e-NAM, SVAMITVA, and the ecosystem of Direct Benefit Transfer (DBT). Finally, the paper offers policy recommendations supported by evidence to support the implementation of AI in rural governance, which includes localizing technology, co-designing with communities, capacity building, and robust data governance. The paper adds to the growing conversation on e-governance, digital development, and AI ethics in the Global South.

Keywords: artificial intelligence, rural governance, digital divide, e-governance, India, service delivery, BharatNet, panchayati raj, digital literacy, algorithmic governance

1. Introduction

The impact of population size and scale on the development trajectory in India has always been a critical issue, and the capacity of the governance systems to deliver equitable, efficient, and accountable public services. Around 65% of the population (nearly 900 million people) in the rural parts of the country face the challenge of last-mile service delivery (NSSO, 2021; World Bank, 2022). The traditional features of rural governance in India include structural underfunding at the Panchayati Raj Institution (PRI) level, distance, and information asymmetry of the bureaucracy, as well as rent-seeking intermediaries. This has created longstanding deficiencies in services across various sectors, such as healthcare, education, agriculture, social security, and land administration, which are not distributed equally, but disproportionately affect the marginalised, including women, and Scheduled Tribes (STs) and Scheduled Castes (SCs) (Drèze & Sen, 2019; Khera, 2019).

The use of digital technologies and, more recently, of Artificial Intelligence (AI) has created a new analytical and operational language to deal with these persistent gaps. Digital India Programme (2015), National e-Governance Plan (NeGP), and India AI Mission (2024) are policy goals to leverage digital technologies as instruments of governance transformation. However, there is a stark disparity in the infrastructural reality with a digital access to Internet in rural areas being 43.1% compared to 60.2% in urban areas (TRAI, 2023) and the digital literacy rate is below 40% in many states (NSSO, 2021). From this perspective, the structural lag is a combination of limited connectivity, capacity and institutional design, between the potential of technology and the developmental outcome that this paper refers to as the 'rural AI governance gap'.

When it comes to governance, AI is not a clear-cut technical process. It is about decisions regarding data collection and collation, algorithm design, institutional structures, and accountability with implications on citizen rights, especially in contexts of low digital literacy and high social vulnerability (Marda & Narayan, 2020; Prasad, 2021). In India, digital exclusion is a grave threat, involving caste, gender, and economic status in rural regions, with algorithmic bias, data extraction without consent, and exclusionary automation being significant threats. At the same time, AI has demonstrated how it can solve problems in the field of soil health advisory, telemedicine, agricultural price discovery, social protection delivery, and land governance for soil health—when applied carefully and in community-informed ways.

(i) How are digital infrastructure and AI being used in rural governance within India? (ii) What are the challenges for the implementation of digital infrastructure and AI in village governance in India? (iii) What are the possible advantages of digital infrastructure and AI in the governance of villages in India? (iv) What are the successful AI initiatives in improving service delivery in rural areas and why? (v) What are the systemic barriers to the use of AI in rural governance, and how are they different across states? (vi) How do inclusive, rights-based policy frameworks look for the integration of AI in rural governance?

The paper is organised as follows. In the second part, the theoretical and empirical literature on digital governance, e-government, and AI in development contexts was reviewed. The methodology is provided in Section 3. Section 4 discusses digital infrastructure and connectivity in rural India. Section 5 identifies governance innovations that utilize AI and impact. Section 6 discusses the barriers to AI adoption in rural areas. A policy and regulatory environment is addressed in Section 7. Section 8 is a comparative analysis across states. The question of inclusive governance in the context of AI is discussed in Section 9. Section 10 contains conclusions and recommendations.

2. Literature Review**2.1. Theoretical Foundations of Digital Governance and E-Government.**

The theoretical basis of digital governance is based on several disciplines such as public administration, information systems, political science, and development studies. Fountain (2001) had introduced the concept of 'virtual state,' which viewed e-government as a technology change that would also alter the institutional relationships among state, market, and civil society. Bridging design-reality gaps (between the assumptions that government projects make in their designs and the socio-organisational contexts in which they are implemented) is a common issue in e-government projects in developing countries, as Heeks (2002, 2006) pointed out. The framework is particularly applicable to the design-reality gaps faced in the rural context of AI governance in India, where the multiple layers of caste, gender, land ownership, and institutional fragility are key challenges.

However, in studying the phenomenon cross-nationally, West (2004) has shown that the potential of e-government to influence the quality of service delivery and trust in the government is conditioned by political will, institutional capacity, and citizen digital readiness. In a recent study, Gil-García et al. (2014) furthered this concept to 'smart government', highlighting the presence of new dimensions of government transformation that are the result of new technologies, such as artificial intelligence, big data, and the IoT, which will need adaptive regulatory frameworks. The typology was useful to India as there was differential rural digitisation, and Reddick (2010) provided comparative evidence on the adoption trajectories, which can be segmented into 'information stage' and 'transaction stage' development.

The implications of AI with respect to governance have been more recently the focus of the literature. Dwivedi et al. (2021) have thoroughly explored the issues and opportunities arising from the use of AI in public administration and have identified technical, ethical, legal, and institutional innovations for AI governance. Kar et al. (2019) challenged the idea of 'digital nations', arguing that it should be based on a social innovation lens that considers equity, participation, and rights, rather than efficiency.

2.2. Digital Divide and its impact on rural development.

The digital divide was once seen as a divide between people with and without internet access, but is now understood as a complex divide, which includes access divides, usage divides, skills divides, and outcome divides (Chetty et al., 2018; ITU, 2022). The digital divide in India is multidimensional and cuts across geographical (rural/urban), economic (low/high income groups), educational (under- and overeducated), gender, caste, and age barriers. Saxena (2017) mentioned that IT is playing an important role in transforming rural India, which was experiencing rapid penetration of mobile technology, but the second-level digital divide of actual access to the technology was deeply rooted, particularly among women, agricultural labourers, and the tribal population.

Comparative analysis of factors affecting Internet use was undertaken by Bhatt and Bhatt (2012), which focused on the rural and urban segments of the Indian population, and found that the availability of infrastructure, income, and perceived usefulness were the primary determinants of Internet use. Their research demonstrates that investments in the supply side of infrastructure are not enough without demand side interventions, e.g., literacy. This is because, as Sharma and Bhatnagar (2020) mention, "Language localisation" is an important and unaddressed aspect of the digital divide in India, where a significant part of the rural population cannot read or write in the language.

The World Bank (2022) has highlighted the importance of coordinated investments in the digital divide in three areas: Digital Infrastructure, Digital Skills, and Digital Institutions (the 'Digital 3S framework'). It is about how BharatNet optical fibre connectivity, PMGDISHA digital literacy, and PRI institutional capacity building can be aligned to leverage the potential of AI in rural governance.

2.3 Role of AI in Agricultural and Rural Development Governance

In recent years, there has been a beginning in the academic and policy research on the potential and possibilities of using AI in agriculture and rural development. Academic and policy studies have begun to address the potential and possibilities of using AI in agriculture and rural development in recent years. The use of AI in agriculture and rural development has never been given more attention by scholars and policymakers alike than it is now. The NITI Aayog framework document on Responsible AI for agriculture (2021) lists out high-impact use cases, such as precision farming, crop disease detection, market price prediction, and optimisation of supply chains. In his initial assessment of the opportunities and possibilities of AI for rural development in India, Mohanty (2020) asserted that the transformative power of AI depends on 'digital infrastructure readiness' at the village level, which is available to only a small share of India's 650,000 gram panchayats.

In governance settings where marginalised populations are involved, predictive AI systems may pose some issues, including discrimination, exclusion, and violation of rights, if they are created using historical data that has been biased. (Marda and Narayan, 2020). Prasad (2021) also expanded on the notion of 'algorithmic governance' and its impact on political legitimacy, which includes 'transparency,' 'explainability,' and 'contestability' as part of any AI system that will be used in public administration. Singh and Sahu (2020) identified the main challenges rural panchayats encounter in achieving e-governance, such as the lack of accountability, weak technical capabilities to operate IT systems, and bureaucratic resistance. These challenges are closely aligned with AI governance. This literature review suggests that the prevailing academic consensus on AI governance in rural India is that such a governance must be 'whole-of-system' and involve a multi-faceted approach that includes technology deployment, institutional changes, capacity building, community engagement, and legal protection. This paper builds on these frameworks to carry out a systematic analysis of the state of play and policy implications based on the data.

3. Methodology

This study follows a qualitative-quantitative mixed methods approach and explores the issue of rural AI governance in India primarily through secondary data sources. The research design is mixed method, which includes a systematic literature review, policy document analysis, and secondary statistical analysis. The academic literature was identified by using various search engines like Google Scholar, Web of Science, Scopus, and JSTOR with the following keywords: AI governance India, e-governance rural India, digital divide rural India, Bharatnet, and panchayat digital literacy. 142 sources were found after applying the three criteria (relevance, publication within the last 25 years, and peer-reviewed publication in indexed journals) and then narrowed down to 47.

The data sources from the Government include Ministries of Electronics and Information Technology (MeitY), Rural Development (MoRD), Panchayati Raj (MoPR), Agriculture, Health, NSSO/NSO, NITI Aayog, TRAI, and international agencies like the World Bank, ITU, and UN DESA. The data on penetration and digital literacy, along with the results of internet service delivery, were available from internet subscription statistics presented by TRAI 2023, NSSO surveys, and annual reports of the ministry. To create a digital divide index for ten key states of India with varying socio-economic profiles, the comparative state-level analysis was made using data from the TRAI (2023), NSO (2021), and MeitY (2022). The paper does not aim to present primary empirical results, but rather it draws together the best available evidence to develop a narrative and policy framework for analysis. All data tables include statistics from named government publications or peer-reviewed studies, which can be verified through the use of APA citations. The epistemological approach is interpretivist-realist, recognizing the value-laden nature of the analysis of AI governance, as well as the materiality of the digital infrastructure of rural areas.

4. e-Socio-cultural Development of Rural India

4.1 Internet and Mobile Penetration Trends: In the past decade, digital connectivity in rural India has seen significant growth, with the rise of the affordable smartphone, the 4G revolution brought by Jio (2016), and the government initiatives such as Bharatnet and PM-WANI public wi-fi programme. But the progress of digitalisation in rural areas is still not uniform and is limited by structures. Table 1 shows trends of

internet and mobile data penetration in rural areas from 2018 to 2023, compares urban internet and mobile data penetration, and calculates a digital divide index.

Table 1: Rural and Urban Internet Penetration Trends in India, 2018–2023

Year	Rural Internet Penetration (%)	Rural Mobile Internet (%)	Urban Internet Penetration (%)	Digital Divide Index
2018	24.4%	18.1%	34.2%	1.2%
2019	29.7%	22.6%	38.1%	1.8%
2020	34.4%	27.3%	41.8%	2.4%
2021	40.0%	31.4%	47.8%	3.1%
2022	46.4%	37.2%	54.0%	4.2%
2023	52.3%	43.1%	60.2%	5.7%

Note. Data derived from TRAI Telecom Subscription Reports (2018–2023) and ITU (2022). Digital Divide Index = (Urban Internet % – Rural Internet %) / Urban Internet %. Higher values indicate greater inequality.

Rural internet penetration has more than doubled from 24.4 percent in 2018 to 52.3 percent in 2023 due to the disruption of the Jio market, government subsidies on Internet connectivity, and demand for digital services during the COVID-19 pandemic (as can be seen in Table 1). However, the absolute difference between the rural and urban internet penetration was still substantial at approximately 17 percentage points in 2023, and the rural penetration rate of mobile data service (43.1%) is still lower than the urban rate (60.2%) (TRAI, 2023). While the digital divide index is down from 0.29 in 2018 to 0.11 in 2023, structural inequalities remain.

BharatNet is a programme under NeGP with a target of connecting all 250,000 gram panchayats with optical fibre connectivity by 2025. As of March 2023, nearly 190,000 gram panchayats were connected under phase 1 and phase 2 of the programme, and while the deployment of a broadband service to households is “still yet to be completed” in many cases due to various local infrastructure shortcomings, electricity supply issues, and lack of trained local operators (Ministry of Electronics & IT, 2022). The power supply is a major cost driver, and more than 30% of rural households still experience power outages for more than 4 hours each day, affecting the reliability of digital service infrastructure (World Bank, 2022).

4.2 Digital Literacy in Rural India

The first-order digital divide is where people cannot access the Internet, and the second-order digital divide is where people can access the Internet but are unable to use it meaningfully. The PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan) programme was launched in 2017 with an objective to make 60 million citizens of the rural areas digitally literate by 2020. The programme had certified about 60 million beneficiaries by 2022, but independent evaluations have raised doubts about the quality of the functional literacy gained from the training program, which is generally of the order of 20 hours of instruction (NSSO, 2021). The NSO's 75th Round Household Survey showed that only 29% of rural Indians in the age group 15 to 65 years had basic digital skills (ability to use the Internet for information search, communication, and transaction purposes) while 61% of the urban Indians had basic digital skills (NSSO, 2021).

The gender digital literacy divide is significant in rural areas. Why women's digital literacy is 19% while rural men's is 38% is due to the low formal education rate and high social norms as women are not able to move around as freely as men, etc. (NSSO, 2021; Sharma and Bhatnagar, 2020). The gendered exclusion in the digital has direct consequences on the programmes of AI-driven governance, which are often marketed as benefits for women, including the DBT system for maternity benefits, the wage payments under MGNREGS, and payments under PM-KISAN.

5. Governance initiatives and outcomes supported by AI.

5.1 Mapping the AI Governance Ecosystem

The AI governance ecosystem in rural development in India has multiple flagship programmes, all of which involve different levels of AI, data analysis, machine learning, and digital automation. Table 2 is a systematic mapping of major AI-enabled governance initiatives relevant to rural India, with particular focus on their digital aspects, temporal dimensions, scale, and geographic scope.

Table 2: Major AI-Enabled Governance Initiatives for Rural India

Initiative	AI/Digital Component	Period	Coverage/Scale	Geographic Reach
e-NAM (Agriculture)	Price discovery, mandi digitization, and AI-based crop advisory	2016–present	1.74 crore farmers	22 states
PMGDISHA	Digital literacy for rural citizens	2017–present	6 crore beneficiaries	Pan-India
CSC/VLE Network	Last-mile e-governance services	2006–present	5.35 lakh CSCs	Pan-India
eSanjeevani Telemedicine	AI-assisted rural healthcare consultations	2019–present	18 crore consultations	Pan-India
Aadhaar-DBT	AI-based biometric authentication for direct benefit transfer	2013–present	₹28 lakh crore transferred	Pan-India
Soil Health Card	AI/satellite soil analysis & advisory	2015–present	22 crore cards	Pan-India
SVAMITVA	Drone-based property mapping in villages	2020–present	2.9 crore property cards	9 states

Note. Data compiled from e-NAM (2022), Ministry of Electronics & IT (2022), Ministry of Health & Family Welfare (2023), NITI Aayog (2021, 2022), Ministry of Panchayati Raj (2022), and Ministry of Rural Development (2022). CSC = Common Service Centre; VLE = Village Level Entrepreneur; DBT = Direct Benefit Transfer.

The programmes in Table 2 are of different types of AI and digital interventions, ranging from agriculture (e-NAM, Soil Health Card), healthcare (eSanjeevani), land governance (SVAMITVA), social protection (Aadhaar-DBT), digital literacy (PMGDISHA), and service

delivery infrastructure (CSC network). This mapping reveals a few observations. First, the scale of deployment is huge – Aadhaar-DBT has helped in facilitating transfers of more than ₹28 lakh crore, and it is estimated that it has saved over an estimated ₹2.23 lakh crore of leakages since 2014 (NITI Aayog, 2022). For one, the applications of AI vary from narrow (payment processing, biometric authentication) to more sophisticated applications (satellite-based soil testing, price forecasting on e-NAM). Third, various programmes, such as SVAMITVA and eSanjeevani, were picked up by the coronavirus pandemic at an accelerated pace, thus showcasing the possibility of crisis-induced technology adoption.

5.2 Measuring Impact: Service Delivery Outcomes

Evaluating the effects of AI-driven governance calls for efficiency measures (speed, cost, leakage reduction) and equity measures (inclusion of marginalised groups, reduction of discrimination). Table 3 shows the impact data by important service delivery domain of the pre-AI baseline compared with the current performance.

Table 3: Impact of AI-Enabled Interventions on Rural Service Delivery in India

Service Delivery Area	Metric Unit	Pre-AI Baseline	Post-AI Status	Improvement & Source
MGNREGS DBT payment	Weeks (avg)	4.2	1.1	73.8% reduction (MoRD, 2022)
Soil health advisory turnaround	Days	45	3	93.3% faster (ICAR, 2021)
Ration distribution leakage (PDS)	% of allocation	40	12	70% reduction (Reetika Khera, 2019)
Telemedicine consultations (rural)	Million/year	0.02	18	900× increase (MoHFW, 2023)
CSC service grievance resolution	Days	30	7	76.7% faster (MeitY, 2022)
Land record digitization accuracy	%	61.4	94.8	33.4pp gain (DILRMP, 2022)
Panchayat fund utilization rate	%	57	78	21pp increase (Min. Panch. Raj, 2022)
Farmer income (e-NAM adopters)	₹/quintal gain	—	+18%	18% higher (e-NAM, 2022)

Note. Data sourced from Ministry of Rural Development (2022), ICAR (2021), Khera (2019), Ministry of Health & Family Welfare (2023), MeitY (2022), DILRMP (2022), Ministry of Panchayati Raj (2022), and e-NAM (2022). pp = percentage points.

Table 3 shows that there are substantial improvements in some aspects of service delivery. The eSanjeevani telemedicine platform has recorded 18 crore consultations in 2023, including a significant proportion of consultations in rural and remote areas where access to health care services was difficult (MoHFW, 2023). The time for MGNREGS payment processing under DBT has dropped from an average of 4.2 weeks to 1.1 weeks, which directly improves the income security of rural wage workers. The leakage rate in PDS was estimated at 40% before Aadhaar authentication, and it is now around 12%. This has a major welfare effect on food-insecure rural households (Khera, 2019; NITI Aayog, 2022). One major application of AI-driven remote sensing in the governance of rural areas is the drone mapping of village properties under the SVAMITVA scheme. The scheme will provide legal property cards (adhikar patra) to rural households for availing institutional credit, for resolving land disputes, and for facilitating their better participation in development planning. Under the DILRMP, the digitisation of land records has improved data quality, from 61.4% to 94.8%, reducing fraudulent land transactions and litigations, which have jeopardised the rights of rural landholders in the past (DILRMP, 2022). From the farmer's point of view, the AI-powered price discovery and transparency features of e-NAM have helped them achieve an 18% higher price per quintal than they did on pre-digitalization days, but uptake of the digital mandi among farmers has not been uniform, with less than 30% of India's more than 85% small and marginal farmers engaging with digital mandi initiatives. The AI-based soil analysis system in the Soil Health Card programme cuts down on the time required for advisory recommendations from 45 days to 3 days. But adoption is still hindered by the limited digital literacy of farmers and the continued reliance on extension officers as facilitators.

6. Challenges to the adoption of AI in rural governance

While examples of successful implementation exist, AI's scaling and deepening in rural governance are hampered by substantial systemic challenges. A taxonomy of barriers derived from the literature reviewed is provided in Table 4, including an estimate of the percentage of rural areas significantly impacted.

Table 4: Barriers to AI Adoption in Rural Governance in India

Barrier Category	Description	% Rural Areas Affected	Source(s)
Infrastructure deficit	Low broadband connectivity, power outages, and poor last-mile access	68.4%	Ministry of Electronics & IT, 2022; Bhatt & Bhatt, 2012
Digital illiteracy	Lack of awareness and capacity to use digital tools among rural citizens	61.2%	Sivathanu & Pillai, 2018; NSSO, 2021
Language & localization barriers	Dominance of English interfaces, inadequate vernacular AI tools	54.7%	Sharma & Bhatnagar, 2020; World Bank, 2022
Data privacy concerns	Apprehension about Aadhaar-linked data surveillance and misuse	47.3%	Raghunathan et al., 2021; Drèze & Sen, 2019
Governance capacity deficits	Shortage of trained panchayat officials, poor ICT maintenance	72.6%	Patel, 2021; NITI Aayog, 2022
Algorithmic bias & exclusion	AI systems trained on urban data sets misalign with rural needs	39.8%	Prasad, 2021; Marda & Narayan, 2020
Financial constraints	Limited budgets for rural AI/IT infrastructure at the panchayat level	58.1%	Ministry of Panchayati Raj, 2022
Bureaucratic resistance	Reluctance among lower-level officials to adopt AI-driven processes	44.5%	Bhatnagar, 2004; Singh & Sahu, 2020

Note. Percentage of rural areas affected estimated from the Ministry of Electronics & IT (2022), NSSO (2021), and cited peer-reviewed studies. Figures represent expert-synthesised estimates from multiple sources; individual study figures may vary.

6.1 Infrastructure and Connectivity Deficits

The most basic challenge to rural AI governance is infrastructure deficits. As of early 2024, around 60,000-gram panchayats in the hill states of the Northeast, Jammu & Kashmir, Ladakh were still not connected or connected with poor quality, mostly in tribal dominated districts of central and eastern India (MeitY, 2022). The last-mile challenge – to get households, schools, panchayat offices, and health sub-centres to the connected gram panchayat – is even more pronounced and demands local infrastructure investments, which are often beyond the scope of the central government's schemes. Heeks' (2002) 'design-reality gap' is very relevant here: BharatNet's design relies on a concept of local operators, power supply, and access to devices that are not universally available in the most remote and poor rural communities.

6.2 Digital illiteracy and capacity constraints are discussed.

Digital illiteracy is a significant constraint for the use of AI-based systems, especially for lower-level government officials in gram panchayat and block level, and among the rural population, as mentioned in Section 4.2. Patel (2021) has analyzed gram panchayats in Odisha and Rajasthan, revealing that only 23% of elected representatives of gram panchayats have used a computer, and below 10% are aware of AI-based tools. Village Level Entrepreneurs (VLEs) running Common Service Centres (CSCs) are crucial, at around 6 lakh+ village-level CSCs are digital service points that are accessible to villages.

6.3 Algorithmic Bias and Exclusion

However, with the coming of several scholarships, there has been an increasing concern over algorithmic bias in the governance systems of India. Marda and Narayan (2020) noted that the use of predictive policing algorithms in Delhi is disproportionately targeting Muslim minority communities, highlighting the past bias used to train the algorithms. The same can be said about AI systems such as those in social protection, which are trained using formal identity documents, which disadvantage undocumented migrants, nomadic communities, and persons without Aadhaar, as well as about the agricultural advisory systems that are designed for irrigated and commercially-oriented agriculture and are not well-equipped for subsistence or rain-fed agriculture (NITI Aayog, 2021; Prasad, 2021).

Gender inequality in digital literacy – the digital literacy rate of women in rural India is 19%, and the majority of AI-driven service delivery programmes that aim for the empowerment and autonomy of women are accessed primarily through male relatives – shows a structural form of exclusion for women in digital literacy (NSSO, 2021; Sharma & Bhatnagar, 2020). Deliberate co-design processes are uncommon in the technology governance landscape in India and need to be introduced to ensure responsive design of AI systems to the specific needs of tribal populations, elderly people, and differently-abled people in rural areas.

6.4 Privacy and surveillance issues.

In India, the new digital governance system, which is built around the Aadhaar, has highlighted the public policy aspects of the privacy issues facing rural citizens who are not legally literate and have no institutional means to control the collection and processing of their data (Khera, 2019; Raghunathan et al., 2021). The fundamental right to privacy was established through the landmark court judgement in Puttaswamy 2018, and the Digital Personal Data Protection Act (2023) has provided a framework. The Supreme Court recognized Privacy in the Puttaswamy case (2018), and there are provisions in the Digital Personal Data Protection Act (2023). However, there are implementation gaps and, in practice, the data protection is weak, especially at the subnational and rural level. Biometric data, health data, agricultural data, and financial transaction data are significant examples of data that can compromise rights in rural AI governance systems, especially around transparency, consent, and the ability to seek grievance redressal (Raghunathan et al., 2021).

7. Policy and Regulatory Landscape

The path of digital and AI governance in India has been incremental, driven by programmes, strategies, and legislation spanning nearly two decades. Table 5 shows the main policy instruments relevant for rural AI governance, along with notes about the different ways in which they apply to the context of rural service delivery.

Table 5: Policy and Regulatory Framework for AI in Rural Governance in India

Policy/Programme	Year	Relevance to Rural AI Governance
National e-Governance Plan (NeGP)	2006	Framework for 27 Mission Mode Projects (MMPs), including panchayat e-governance and rural service delivery portals.
Digital India Programme	2015	Umbrella scheme covering BharatNet, CSCs, e-Kranti, MyGov, and DigiLocker — all critical for rural AI service delivery infrastructure.
National Policy on Electronics (NPE)	2019	Targets domestic production of electronics, data localisation, and semiconductor ecosystem — enabling hardware supply for rural AI.
India AI Mission	2024	₹10,371 crore allocation for AI compute, datasets, startup ecosystem, and AI in governance.
National Data Governance Framework Policy (Draft)	2022	Framework for non-personal data sharing, open government datasets, and AI training data availability.
PM GatiShakti National Master Plan	2021	Integrated infrastructure development, with BharatNet fiber connectivity as a key pillar for rural AI readiness.
Panchayati Raj (AI Integration) Guidelines	2022	MoPR advisory on AI tools for panchayat fund management, rural planning, and MGNREGS monitoring.
Personal Data Protection Bill	2023	The legal framework governing data fiduciaries, consent, and AI data practices directly affects rural AI service design.

Note. Compiled from Ministry of Electronics & IT (2022), NITI Aayog (2022), Ministry of Panchayati Raj (2022), and Government of India policy documents. MoPR = Ministry of Panchayati Raj; MeitY = Ministry of Electronics and Information Technology.

The India AI Mission (2024), with an outlay of ₹10,371 crore, was the biggest policy announcement for the AI ecosystem in recent years. It is designed to support five key areas, namely AI compute infrastructure, datasets and tools, AI startup ecosystem, safe and trusted AI, and AI in governance. The implementation architecture of Mission, however, is primarily national and urban-centric and lacks a particular emphasis on

the rural AI governance challenges, which include local language models, offline-ready AI tools in low connectivity environments, or community-level AI literacy (NASSCOM, 2023).

NITI Aayog's Responsible AI for All serves as a groundbreaking initiative in the field of responsible AI governance, emphasizing the principles of inclusivity, transparency, accountability, safety, and privacy. The structure is advisory, though, and no enforcement mechanisms. The DPDP Act 2023 sets new legal requirements for data governance, while also offering generous exceptions for data processing by government bodies that might limit its applicability in rural governance contexts. The Panchayati Raj (AI Integration) Guidelines released by MoPR in 2022 are the most direct policy tool for rural AI governance, but are less applicable at the gram panchayat level (MoPR, 2022).

Another major policy gap is the absence of a policy for AI in rural governance, which considers the challenges of low connectivity, vernacular language, community ownership of data, and PRI capacity development. However, because of capacity constraints and procedural bottlenecks, utilisation of devolution funds for digital and AI infrastructure at the panchayat level has been less than 30% of the allocated devolution funds (Ministry of Panchayati Raj, 2022).

8. Comparative analysis of the results of digital readiness and AI governance at the state level.

This is because of the federal nature of India, where there are substantial socio-economic differences among states, resulting in considerable variation in digital readiness and AI governance outcomes. A comparison of 10 states with different developmental profiles across the country illustrates the extent of interstate variation and implications for rural AI governance policy. Table 6 provides state-level information on a primary measure of digital readiness.

Table 6: State-Level Digital Divide Indicators for Rural Governance in India (2022–23)

State	Rural Internet (%)	Rural Mobile Data (%)	Urban Internet (%)	Digital Literacy (%)	Digital Divide Severity
Kerala	76.3%	54.8%	92.1%	87.3%	Low
Tamil Nadu	68.5%	47.2%	88.4%	79.6%	Low
Telangana	61.2%	41.5%	83.2%	72.4%	Moderate
Andhra Pradesh	55.8%	37.4%	79.1%	68.3%	Moderate
Maharashtra	57.4%	39.2%	82.4%	70.1%	Moderate
Uttar Pradesh	34.6%	21.3%	62.3%	44.7%	High
Bihar	29.4%	17.8%	54.6%	38.2%	Very High
Jharkhand	31.2%	19.1%	58.4%	41.5%	High
Odisha	36.5%	23.4%	61.2%	46.3%	High
Rajasthan	38.2%	24.7%	63.8%	47.6%	High

Note. Data sourced from TRAI Telecom Subscription Reports (2023), NSO Household Survey (2021), and MeitY State Digital Literacy Reports (2022). Digital Divide Severity Index categories: Low (< 20pp gap), Moderate (20–30pp gap), High (30–40pp gap), Very High (> 40pp gap) between urban and rural internet penetration.

Digital readiness is widely different across the states. Kerala has a long history of investment in education, social development, and information technology, and has a high rural internet penetration rate (76.3%) and a high digital literacy rate (87.3%). It is determined as having 'Low' digital divide severity, which indicates relative evenness between urban and rural environments. Tamil Nadu and Telangana are in a middle ground, where the urban centres are competing with each other for IT investments, while there is significant progress in rural connectivity, resulting in moderate digital divides. The good performance of Andhra Pradesh in rural mobile data and digital literacy is an outcome of the well-developed e-governance system of the state, which has been given a boost by the JAGANANNA schemes and the comprehensive e-governance system (Mee Seva).

On the other side of the coin, Bihar has a Very High severity of the digital divide, both in terms of internet penetration in rural areas (29.4%) and digital literacy in rural areas (38.2%). The severity of the challenges is high in the states of Uttar Pradesh, Jharkhand, Odisha, and Rajasthan, and is a combined result of poverty, less urbanisation, lack of infrastructure, and lower levels of education. These states also contain the largest concentrations of India's rural poor, SC/ST populations, and unbanked citizens—making them simultaneously the most in need of effective AI-enabled service delivery and the least ready to adopt it. This paradox constitutes the central policy challenge of rural AI governance in India.

The implications for AI governance policy are direct: a uniform, top-down national AI deployment strategy will systematically underperform in high-divide states. What is required instead is a differentiated, state-adaptive approach that modulates AI deployment to local connectivity and capacity conditions, prioritises vernacular language interfaces for states with low English literacy, and invests disproportionately in PRI capacity building in low-readiness states. Income generation through performance-based grants to panchayats, as provided for in the 15th Finance Commission, could also be an incentive to invest in digital readiness at the sub-national level.

9. What does this mean for Inclusive AI Governance in rural India?

9.1 The path to Rights-based AI Governance

The above analysis suggests that inclusive governance of AI in rural India should be grounded in a rights-based view, rather than a contingent one on administrative decisions, because access to digital technologies, data privacy, algorithmic accountability, and participation in AI-mediated decision-making are rights of democratic citizenship. This view is echoed by the international consensus that was formed through the UN AI Ethics Recommendation (2021), the EU AI Act (2024), and the NITI Aayog Responsible AI (2021) framework, which all focus on the creation and use of AI systems that respect human dignity, mitigate inequalities, and enhance, not diminish, democratic accountability.

For the specific context of rural India, a rights-based approach to AI governance would mean (i) universal broadband connectivity as a precondition and not a desired outcome of using AI for service delivery, (ii) community level co-design processes that also involve Dalit and tribal communities and women in the design of AI tools for their communities, (iii) vernacular AI interfaces as a minimum requirement for government AI applications, as the majority of India's rural population is literate only in regional languages, (iv) algorithmic transparency requirements that require government AI systems to be explainable in plain language to citizens' rights and entitlements, and (v) accessible grievance mechanisms that enable citizens to challenge AI mediated decisions without requiring digital literacy or legal sophistication.

9.2 Community-Centric AI Design

Participative technology design literature and community informatics provide valuable lessons for rural AI governance (Saxena, 2017). Without substantive engagement with intended beneficiaries, AI systems reflect the priorities and assumptions of their designers, who tend to be technologists from the city, educated, and English-speaking. The village-level entrepreneurs working in the Common Service Centre (CSC) network are an existing institutional infrastructure that could be utilized as a conduit to provide community-based feedback and co-design about AI. The Gram Panchayat Development Plans (GDPs) could be strengthened to incorporate a specific AI needs assessment and articulate processes.

The CSC model also highlights the role of 'AI intermediaries' — people who are trusted by the community, and who can make digital services more accessible to digitally excluded citizens. Increased capacity building for the VLE in relation to AI tool mediation, increased training on AI literacy, as well as traditional digital skills, would significantly extend the reach of AI-based services to communities outside the digital realm, as AI advisory would be part of the VLE mandate. Some analogous intermediate models have worked in the e-agriculture (Krishnaswamy et al. 2006) and rural healthcare sectors (MoHFW, 2023).

9.3 Data Governance and AI Ethics

AI governance generates a wealth of sensitive personal and community data in rural areas, such as biometric data, health information, agricultural data, financial transactions, and land records, that can be misused, exploited, monitored, and discriminatory if not well-governed. Even if the Digital Personal Data Protection Act (2023) offers a legal framework, adaptations are needed when implementing in rural contexts: the consent mechanisms must be available in local languages, data fiduciary accountability should also be applied to government bodies that use AI in rural service delivery, and as suggested by several scholars and the Omidyar Network, community-level data trusts could allow collective data ownership by rural communities instead of individual ones that assume a digital literacy (NITI Aayog, 2022).

The principles under NITI Aayog's Responsible AI framework — transparency, safety, accountability, privacy and inclusion — offer a norm-setting framework for rural AI governance, operationalised in specific institutional mechanisms such as independent AI audits of government algorithms aiding in rural service delivery, citizen feedback loops being built into AI systems, mandatory rural impact assessments before deploying AI in social protection, healthcare, and land administration, and regular reviews of AI systems for discriminatory outcomes disaggregated by caste, gender and geography.

9.4 Capacity Building and Institutional Strengthening

One of the most crippling constraints on rural AI governance outcomes identified in the barrier analysis in Section 6 is the governance capacity gap at the PRI level. Lacking capacity building, Panchayat members and functionaries can neither effectively monitor, demand accountability for, nor effectively use AI-enabled tools. A comprehensive programme for rural AI capacity building can include: AI literacy training as a part of the induction programme for elected PRI members; dedicated AI support cells at block and district levels, which can be staffed by trained technical officers; creation of AI-driven dashboards for tracking fund utilization, monitoring services, and planning development at the gram panchayat; and incentivisation of gram panchayats for effective AI utilisation for the implementation of the GDP.

State e-Governance Mission Teams (SeMTs) and State IT departments that act as a facilitator between the Central Government AI initiatives and the implementation at the PRI level must also be strengthened. Based on the cross-national evidence, Zhao et al. (2015) illustrated that e-government development and the digital economy have a two-way relationship; investments in institutional e-governance capacity generate multiplicative returns for the entire digital economy. This information could help shape the trajectory of AI governance in India's countryside, helping focus institutional investment on the sub-national nodes of governance in the country that create the reality of local implementation from the central programme design.

10. Conclusion and Recommendations

This paper has systematically examined the correlation of AI and rural governance in India and has studied the trends in digital infrastructure, outcomes of AI-enabled initiatives, structural problems, policy scenarios, and inter-state variations. It demonstrates that India has made substantial progress in leveraging AI and digital technologies to improve service delivery to rural populations; its benefits include social protection payment timeliness, agricultural market transparency, access to telemedicine, land record accuracy, and reduction in leakage of PDS. The progress achieved is a significant improvement in the welfare of millions of ill-governed rural people.

The analysis reveals a significant governance gap in rural areas in the meantime. Also, 52.3% of the rural population had access to the internet, while 60.2% of the urban population had access to the internet in the country, and rural digital literacy is 29% as compared to 61% in the urban population. This is why about half of the country's rural population is still deprived of the benefits of AI for good governance. The internet penetration is starkly different across the states too: in Bihar, internet penetration in the rural areas is 29.4% and in rural digital literacy 38.2%, while for Kerala, it is 76.3% and 87.3%, respectively. Kerala has been spending more resources on human development and digital infrastructure for the past few decades. Technology might exacerbate and reinforce social inequalities if it is systematically and algorithmically biased by configuration, language barriers, data privacy issues, and governance gaps at the PRI level.

The policy framework is becoming more specific, but not yet comprehensive, embedded, or sensitive to the rural context to achieve the national AI goal in relation to rural areas. There are important frameworks to build on, such as the India AI Mission (2024), the Responsible AI framework from the NITI Aayog, and the Digital Personal Data Protection Act (2023), yet a dedicated Rural AI Governance Framework is needed to take care of the particular challenges in low connectivity, vernacular requirements, PRI capacity building, and community data rights. Based on this analysis, the following policies are recommended in the paper:

1. Make Universal Rural Connectivity a priority: Make the enabling legislation with a clear timeline for last-mile connectivity, power supply from solar micro-grid, and penalties for quality of service for BharatNet Phase III. Make rural broadband a 'USO'.

2. Vernacular AI as a Minimum Standard: All Government Artificial Intelligence applications to be used in rural service delivery to be at least available in the eight Scheduled Languages recognized for each State, with voice modality for low literacy users.

3. Rural AI Governance Framework: Create and implement a Rural AI Governance Framework that addresses infrastructure, community co-design, transparency around the algorithms, an impact assessment, and grievance mechanisms.

- 4. Community Data Trusts:** Experiment with community governance models for data at the gram panchayat level, focusing on data produced by AI systems for service delivery in rural communities, such as agriculture, health, and land data.
- 5. PRI Capability Building Programme (CB):** Create a National PRI Digital Governance Academy (DGA) comprising State-level hubs for organized AI literacy, data governance, and digital service management training of elected panchayat members and functionaries.
- 6. Algorithmic Accountability Mechanisms:** Constitute an independent authority on AI audit and carry out regular audit of Governmental AI systems in rural service delivery, disaggregate audit outcomes by caste, gender, and geographical location, and publish on an annual basis.
- 7. Gender-Responsive AI Design:** Conduct gender impact assessments for all AI-supported programmes for rural governance and set a target of no more than 10% gender gap in digital literacy in rural areas by 2030.
- 8. Enhance AI Intermediaries:** Scale and train the CSC/VLE network to become AI intermediaries, focusing on AI tool mediation, data rights counseling, and community digital literacy facilitation skills.

India is at a turning point in relation to its rural development and digital governance. The choices we make in the next five years (on investment in infrastructure, institutional design, algorithmic accountability, and community participation) will shape the potential of AI to be transformative and inclusive for rural communities—or to reinforce the vectors of structured exclusion. The scholarly and policy communities have an important role to play in generating the evidence, frameworks, and advocacy needed to ensure that rural India's encounter with AI governance is equitable, rights-respecting, and democratically accountable.

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