IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

The Role of AI in Widening or Bridging the Digital Divide between Urban and Rural India.

Sara Mansuri
Independent Researcher
BSc-IT Graduate, 2024
Formerly at P P Savani University, Gujarat, India

Abstract - India's rapid digital transformation, primarily driven by advancements in artificial intelligence (AI), is significantly impacting its urban-rural divide. While metropolitan regions benefit from AI-enabled innovations in healthcare, education, and governance, rural areas continue to face digital exclusion due to inadequate infrastructure, low digital literacy, and limited policy attention. This research critically examines how AI technologies impact the digital divide in India by analyzing secondary data from urban and rural case studies, such as Bangalore and Coochbehar. The findings reveal that AI integration is highly urban-centric, with rural areas receiving fragmented and insufficiently supported interventions. Although AI holds the potential to bridge socio-technological gaps, without inclusive development strategies and targeted rural initiatives, it risks reinforcing existing inequalities. The study concludes with recommendations for policy reforms, rural AI literacy programs, and community-led innovation to promote equitable digital progress across India.

Keywords - Artificial Intelligence, Digital Divide, Urban-Rural Disparity, India, Digital Infrastructure, Rural Development, Smart Cities, Digital Literacy, Inclusive Innovation, Public Policy.

I. INTRODUCTION

India, a nation of over 1.4 billion people, is undergoing a rapid digital transformation, mainly driven by the advancements in artificial intelligence (AI) technologies [7]. However, this growth is excessively concentrated in urban areas thus leading to a widening digital divide, a socio-technological gap among those with access to digital tools and those without. While metropolitan regions profit from AI-driven innovations in healthcare, education and urban governance, rural communities frequently lack the necessary digital infrastructure, literacy and policy attention to participate completely in the digital economy. AI technologies refer to systems capable of performing tasks that typically require human intelligence, such as learning, problem solving, and decision-making. Despite its national potential, AI adoption in India remains largely urban-centric. The rural-urban difference in internet penetration, which stood at 37% and 69% respectively as of 2023, further, strengthens this divide [1].

This study critically analyses how AI technologies effect the digital gap between rural and urban India. It seeks to comprehend the extent to which AI exacerbates or alleviates this divide and discovers the socio-economic consequences of uneven AI integration.

The paper is organized into six sections: introduction, literature review, methodology, results, discussion and conclusion, to provide the complete analysis of this pressing national issue.

II. LITERATURE REVIEW

The digital divide in India is the multidimensional issue formed by socio-economic, infrastructural and policy-related factors. Several scholars have discovered these themes with the growing focus on how developing technologies, including AI, may widen or narrow the gap among the rural and urban areas.

1) Educational Disparities and Digital Access.

According to [2], who examine the digital divide in the educational sector within the Coochbehar, a hesitant district in West Bengal. Their findings disclose that students in rural and peri-urban regions face important challenges in accessing digital learning tools including lack of devices, internet connectivity and digital literacy. This is in plain contrast to urban schools where AI-powered educational platforms and digital classrooms are increasingly common. The study highlights the structural disadvantages rural students face and how these issues may deepen if AI integration remains confined to urban settings.

2) Infrastructure and Urban-Centric AI Development

According to [3], who critiques the urban bias in India's digital policy through the review of AI-driven smart city creativities. While these projects aim to rally sustainability and governance, they tend to concentrate resources in urban zones, exacerbating the rural-urban technological divide. Das highlights that policy

frameworks frequently ignore rural digital needs, thus reinforcing systemic inequality in the AI deployment and benefits.

3) Socio-Economic Determinants of Digital Inequality.

According to [6] provides the comparative analysis of digital society emergence in rural and urban India. He identifies factors such as income disparity, educational attainment and state-level infrastructure investment as the key drivers of digital inequality. Notably, the study underscores that without targeted interventions, the proliferation or spread of AI technologies could further marginalize rural populations due to the pre-existing structural limitations.

4) Bridging the Rural Divide through Innovation.

As per the [9] take the more solution-oriented approach by analyzing technological adoption in rural India. They argue that entrepreneurship and grassroots innovation can play the vital role in AI diffusion beyond urban centers. Case studies in the article show how local start-ups and community-driven programs are beginning to address rural challenges using AI in agriculture, healthcare and microfinance. However, the authors note that such enterprises continue under-supported and under-scaled.

5) Gap in the Literature and Contribution of the Current Study.

While these studies proposal valuable insights in the wider digital divide, few straight examine how AI specially contributes to or manage rural-urban disparities at a national scale. This paper addresses that gap by examining AI's dual role as both a catalyst for inclusion and a probable agent of exclusion, contribution the comprehensive view of their influence on India's digital inequality.

III. METHODOLOGY

This study employs the qualitative content analysis combined with the comparative case analysis to inspect the impact of AI technologies on the digital divide among the urban and rural regions in India [6]. Secondary data sources including peer-reviewed academic articles, government reports and policy documents analyzed to **assess** AI implementation patterns, infrastructural disparities and socio-economic outcomes.

Data were sourced from the reputable databases as JSTOR, Springer, Frontiers and Scopus, as well as government portals like NITI Aayog, TRAI and the Ministry of Electronics and Information Technology. To ensure relevance and that the data reflected recent technological trends, only materials published post-2019 were included that focusing specially on AI-related digital infrastructure, educational access and policy creativities.

A comparative case approach was used to contrast AI developments in the urban tech hub Bangalore, known for their smart city and AI innovation ecosystems with the rural region like Coochbehar, recognized in the literature for their digital lag [4]. This contrast provides insights into how socio-geographic factors influence AI diffusion.

The study is limited by their reliance on secondary data and the absence of primary fieldwork or stakeholder interviews, which may constrain the depth of contained insights. However, the use of varied and credible sources improves the reliability and generalizability of the findings.

IV. RESULTS

The analysis reveals that AI adoption in India remains highly urban-centric, with important investments and deployments concentrated in the Tier-1 cities as Bangalore, Delhi and Mumbai. These urban centers benefit from strong digital infrastructure, skilled human capital and favourable policy frameworks, allowing the rapid integration of AI in sectors like the healthcare, governance and education.

In contrast, rural regions lag considerably due to persistent barriers including low digital literacy, limited internet penetration, changeable electricity supply, and lack of AI-specific training programs. Although AI-driven applications in agriculture (e.g., crop monitoring), healthcare (e.g., telemedicine) and education (e.g., adaptive learning platforms) have been piloted in some rural districts, these continue fragmented and lack scale.

Government initiatives as Digital India and PM Gati Shakti aim to association these divides, but implementation has been uneven with rural outreach hampered by the logistical and financial constraints [5].

A clear divide develops in access to AI services:

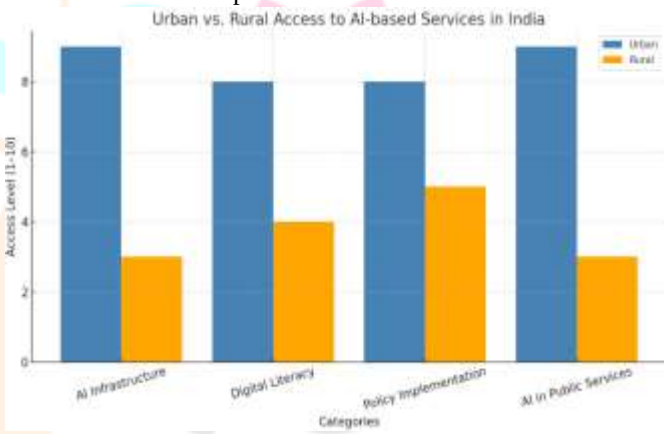

Figure 1. Urban vs. Rural access to AI-based services in India [2]

These findings confirm that without targeted interventions, AI may rather than decrease the rural-urban digital divide.

DISCUSSION

The findings of this study supports the argument that AI technologies disproportionately benefit urban areas, thus contributing to a widening digital divide in India. This aligns with the [3], who critiques that how smart city creativities and AI investments favor urban centers while neglecting the digital requirements of rural populations. Cities like Bangalore exemplify this trend with AI seamlessly unified in healthcare, education and public governance, supported by the robust infrastructure and policy alignment.

In contrast, rural areas continue digitally marginalized, echoing the observations of [2], who highlight that how educational disparities persist in undersized regions like Coochbehar due to limited digital infrastructure and technological access. Likewise, [6] classifies socio-economic factors as income inequality, low digital literacy and weak institutional support as core drivers of digital exclusion. These factors jointly hinder rural adoption of AI technologies, even when pilot projects like AI-enabled agricultural support or telemedicine that show promise.

While initiatives like BharatNet and Digital India aim to make inclusive digital infrastructure, their implementation has been inconsistent, mainly in remote regions [8]. Connectivity issues, bureaucratic delays and limited responsiveness continue to disturb their reach and effectiveness.

Notably, AI offers a double-edged sword: on one hand, it has the probable to bridge rural gaps through the scalable solutions in healthcare like AI diagnostics, education like adaptive learning and agriculture (e.g., precision farming). On the other, without comprehensive policy design and rural capacity building, it risks deepening present inequalities by reinforcing urban advantages.

This study highlights the urgency of reframing AI development strategies to be more inclusive, participatory and context-sensitive. Personalized rural AI programs, better digital infrastructure, and investment in local digital literacy are vital if India aims to leverage AI for impartial growth rather than exclusion.

CONCLUSION

This study highlights how the approval of AI technologies in India is presently amplifying the digital divide among the urban and rural regions. While urban centers prosper with AI-driven innovations across sectors, rural areas continue to face systemic barriers limited infrastructure, digital illiteracy and inadequate policy implementation that hinder meaningful AI integration. The findings highlight the importance of inclusive and impartial AI deployment to prevent further marginalization of rural populations.

To address this divide, policymakers should:

- Invest in AI literacy programs in rural schools
- Offer subsidies for AI-powered agricultural tools
- Decentralize innovation hubs to include underserved regions
- Encourage collaborations between NGOs, technologists, and local communities to build scalable, context-specific AI solutions

Future research should discover community-led AI initiatives and include empirical fieldwork, such as case studies, to capture ground-level challenges and successes. A people-centric, comprehensive AI ecosystem is vital for associating India's digital divide.

REFERENCES

[1] E. Bureau, "Rural India is driving internet adoption, survey finds," *The Economic Times*, 2022. Accessed: Jun. 02, 2025. [Online].Available: https://economictimes.indiatimes.com/tech/technology/rural-india-is-driving-internet-adoption-survey-finds/articleshow/93186625.cms?from=mdr

[2] A. Chakrabarti, M. Sarkar, and A. Rai, "Digital Divide in Education in Urban, Peri-Urban, and Rural Areas in India: Coochbehar, A Backward District of West Bengal in Perspective," *New frontiers in regional science: Asian perspectives*,pp.239253,Jan.2024,doi: https://doi.org/10.1007/978-981-97-8872-9_13.

[3] D. K. Das, "Digital Technology and AI for Smart Sustainable Cities in the Global South: A Critical Review of Literature and Case Studies," *Urban Science*, vol. 9, no. 3, pp.72-72, Mar.2025, doi: https://doi.org/10.3390/urbansci9030072.

[4] M. Hemanth, "The Role of AI in Shaping Bangalore's IT Sector: A Comprehensive Analysis of Emerging Trends and Technologies," 2024. Available: https://theacademic.in/wp-content/uploads/2025/01/87.pdf

[5] R. Khedkar, "What is PM Gati Shakti Scheme, Launch Date, Benefits, *"cleartax*, Feb.02, 2025. https://cleartax.in/s/pm-gati-shakti-scheme

[6] M. H. Laskar, "Examining the emergence of digital society and the digital divide in India: A comparative evaluation between urban and rural areas," *Frontiers in Sociology*, vol.8, Apr.2023, doi: https://doi.org/10.3389/fsoc.2023.1145221.

[7] PTI, "India ranks tenth with $1.4 billion private investment in Artificial Intelligence: United Nations report," *The Hindu*, Apr.04, 2025. https://www.thehindu.com/news/national/india-ranks-tenth-with-14-billion-private-investment-in-artificial-intelligence-united-nations-report/article69411505.ece (accessed Jun. 02, 2025).

[8] N. Saini and R. Kharb, "Empowering sustainable development through digital transformation: insights from digital India," *Journal of Asia Business Studies*, Jan. 2025, doi: https://doi.org/10.1108/jabs-07-2024-0408.

[9] S. Sindakis and G. Showkat, "The Digital Revolution in India: Bridging the Gap in Rural Technology Adoption," *Journal of Innovation and Entrepreneurship*, vol. 13, no. 1, pp. 1–28, May 2024, doi: https://doi.org/10.1186/s13731-024-00380-w.