IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Bridging The Urban-Rural Digital Infrastructure Divide In Manipur: Challenges And Opportunities

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Abstract:

This study investigates the persistent digital infrastructure divide between urban and rural areas in Manipur, focusing on the challenges and opportunities in bridging this gap. Despite technological progress, rural Manipur faces inadequate connectivity, limited high-speed internet access, and infrastructural shortcomings compared to urban centers. Key challenges include difficult hilly terrain, low investment in rural telecom networks, and socio-economic issues such as low digital literacy and affordability. Policy implementation gaps and limited local stakeholder involvement further worsen the divide. Opportunities stem from government initiatives to expand broadband under national digital inclusion programs, growing mobile device penetration, and potential public-private partnerships to enhance infrastructure. The study uses a qualitative approach based on secondary data from government reports, policy documents, academic sources, and digital inclusion publications, providing comprehensive insights into infrastructure, socio-economic factors, policies, and technology penetration. Bridging this divide is essential for equitable access to education, healthcare, governance, and economic opportunities, supporting Manipur's socio-economic development. This research lays groundwork for future studies and policy development toward a digitally inclusive Manipur.

Keywords: Digital Divide, Urban-Rural, Manipur.

Introduction:

The digital divide refers to the gap or inequality between individuals or regions with access to digital technologies and the internet. While traditionally centered on access disparities, in modern society, it also encompasses the skills and competence required to use these technologies effectively. Digital divide is the result of varying socio-economic statuses, geographical locations, and educational backgrounds, manifesting as unequal opportunities for digital engagement and socioeconomic advancement(Laskar, 2023). In India, the digital divide is a critical issue, with significant variations in internet access across states and pronounced disparities between urban and rural populations(Sharma, 2023). There is evidence of a palpable digital divide between the rich and the poor, urban and rural areas, men and women, and across different caste and religious groups(Mahendru et al., 2022). According to a report by the Internet and Mobile Association of India (IAMAI), "the internet penetration rate in rural India was only 29% in 2020, compared to 63% in urban areas" (Bajwa, 2023).

The National Achievement Survey (NAS) 2021 report found that the digital divide has been the sharpest in Assam, Manipur and Meghalaya, where 48% of the students had no digital devices at home (Choudhury, 2022). Manipur, a state in the northeast of India, experience digital divide due to its unique geographical, socio-economic, and infrastructural challenges(Reena Devi, 2025). The infrastructure divide in Manipur is further exacerbated by the rugged terrain, which complicates the deployment of reliable telecommunication networks, and by socio-economic factors such as limited digital literacy and the affordability of digital services among rural communities(Ahmad Shairgojri, 2022; Dubey et al., 2024). According to the Census of Manipur, 50.00% of rural households own a radio/transistor, 36.70% a television, 48.90% a telephone, 5.60% a computer/laptop without internet, 1.10% a computer/laptop with internet, 2.40% a landline only, 44.70% a mobile only, and 1.70% both a landline and mobile (Devi et al., 2019).

Review of Literature:

The research literature on linkages between urban and rural digital divides in Manipur reveals several key themes, predominantly focusing on the socio-economic disparities, infrastructure limitations, and policy gaps that perpetuate this technological imbalance (Meitei & Chanam, 2025). Existing studies consistently highlight the complex interplay of geographical challenges, socio-economic factors, and inadequate investment as primary drivers of this persistent divide, underscoring the urgent need for targeted interventions (Singh, n.d.). Despite these acknowledgments, there remains a notable gap in comprehensive studies that thoroughly evaluate the effectiveness of existing government initiatives and the socio-economic impacts of digital exclusion on rural populations (Reena Devi, 2025). Furthermore, the literature often overlooks the nuanced interplay between digital literacy levels, affordability of internet services, and the adoption of technological innovations among rural communities, which are crucial for achieving equitable digital inclusion (Laskar, 2023).

Specifically, there is a dearth of research examining the long-term efficacy of programs like BharatNet and Common Service Centres in mitigating these disparities and fostering sustainable digital empowerment in Manipur's rural areas (Sindakis & Showkat, 2024). But in countries where the gap between the digital haves and have-nots are wide, the sources of rural development information rarely reach the benefactors who are mostly digital illiterates (Guite & Hangsing, 2020).

Methodology:

The study employs a qualitative research methodology, relying primarily on secondary data analysis to explore the challenges and opportunities in bridging the digital infrastructure divide between urban and rural areas in Manipur. This approach allows a comprehensive understanding of the existing socio-economic factors, policy frameworks, and technological penetration across Manipur, drawing on government reports, policy documents, scholarly articles, statistical data repositories, and key publications from national and regional digital inclusion initiatives. This methodology allows in-depth analysis without the constraints of primary data collection, enabling a broad interpretation of the present digital landscape in Manipur.

Challenges:

India’s Northeast faces challenges to meaningful digital connectivity due to insufficient internet penetration and IT infrastructure. The region’s difficult geographical terrain, sparsely populated remote locations, and the threat of natural calamities also constrain the creation of digital infrastructure(Guha,2025). The hilly terrain of Manipur presents significant challenges to the deployment of physical infrastructure, necessitating innovative solutions for network expansion and maintenance(Sharma, 2023). Manipur experience a wide urban-rural disparity in digital infrastructure. According to TRAI reports, December 2025, tele-density in rural Manipur was 41.98% and in urban

Manipur was 13.59%, indicating a substantial digital divide within the state(Meitei & Chanam, 2025). In terms of wireless and wire line subscriptions, rural Manipur was 0.93%, and urban Manipur was 1.46%(The Indian Telecom Services Performance Indicators July- September, 2025, 2025). Rural areas are mainly located in far-flung areas from the cities. In most cases, these areas are situated in hilly regions with poor transport and communication systems and are cut off from the rest of the country (Guite & Hangsing, 2020). In Manipur, urban districts like Imphal, Bishnupur, and Thoubal consistently rank highest in financial, educational, health, and agricultural infrastructure, while rural hill districts such as Ukhrul, Chandel, Senapati, and Churachandpur lag behind, highlighting a clear rural-urban infrastructure divide(Nath, 2017).

Socio-Economic Challenges: Manipur, known for its rich cultural heritage inhabited by various ethnic communities, faces significant socio-economic challenges that affect the development of the state. Manipur has a central valley surrounded by hills. This landscape creates different socio-economic conditions across its regions. It leads to gaps in infrastructure, access to services, and economic opportunities, causing a divide in living standards between areas. Digital Literacy in Manipur is a critical factor where urban population generally exhibits higher rates of digital proficiency and access to resources, while rural communities often struggle with limited educational opportunities and fewer avenues for technological exposure (Devi et al., 2019). The recent ethnic clash has further exacerbated these disparities, disrupting connectivity and hindering digital transformation efforts in affected regions, particularly impacting vulnerable rural populations (De & Solomon, 2023). Further suspension of internet services for more than 200 days in 2023 crippled economic activities and significantly widened the digital gap for vulnerable rural populations (Meitei & Chanam, 2025).

Economic Disparities: Economic disparities between urban and rural areas are pronounced, with rural populations often experiencing lower incomes and fewer economic opportunities, thereby limiting their ability to afford digital services and devices (Guite & Hangsing, 2020). Urban areas in Manipur have better access to education, healthcare and employment opportunities, while rural areas are deprived of such facilities and struggle with poverty. Targeted interventions and policies are essential to address these inequalities. Availability of proper institutions, infrastructures, coordination, committed leadership for development, balanced sectoral development, integrated development plan and proper management of resources with involvement of the local people and to provide general sensitivity to specific conditions by blending the rational of traditional measures with the formal technological and institutional intervention is utmost importance in hills economy of Manipur. (Gonmei, 2013)

Urban vs Rural Infrastructure divide: Road connectivity and reliable transportation networks are significantly better in urban centres compared to rural hill districts, impeding the efficient deployment of digital infrastructure components and maintenance (PAUTUNTHANG, 2024). The valley has better road conditions due to the higher availability of NH and SH that connect the capital city (Imphal) of the state. Most of the district roads and inter-village roads are surfaced due to the plain topography and dense population (Haokip & Reimeingam, n.d.). The expansion of basic infrastructure like transportation, communication, power and broadband connectivity is considered to be extremely vital for the region as a whole (Nath, 2017). However, when compared to other states in India, the urban infrastructure facilities are very poor. The smaller and medium towns in the state of Manipur do not have proper infrastructure facilities such as water supply and waste water management, storm water and drainage, solid waste management and so on (Journals & Khwairakpam, 2015)

Opportunities:

Manipur has implemented a range of initiatives and programs aimed at enhancing digital infrastructure development in both urban and rural areas, reflecting governmental interventions.

Infrastructure Development in Rural Areas of Manipur:

1. Expansion of BharatNet Connectivity: This initiative aims to extend optical fibre connectivity to gram panchayats, thereby providing broadband internet access to remote villages across the state.

Selected state-wise details of Gram Panchayats made service-ready under the BharatNet Project during the last five years.

S. No.	Name of States	Service Ready GPs
1	Assam	15
2	Manipur	1151
3	Nagaland	134
4	Mizoram	420
5	Meghalaya	495

Source: Digital Bharat Nidhi, Department of Telecommunications, Ministry of Communications, Government of India *https://usof.gov.in/en/bharatnet-project*

2. Common Service Centres (CSCs): These centres offer a variety of digital services, including telemedicine, educational courses, and banking, to underserved rural populations, thereby bridging the service delivery gap (Sindakis & Showkat, 2024). According to Department of Information Technology, Government of Manipur, "995 nos. active CSCs of Manipur State located in Hill as well as Valley districts are serving as multiple-services-single-point model for providing facilities for multiple transactions at a single geographical location".
3. Digital Literacy Campaigns: These campaigns are crucial for enhancing the ability of rural inhabitants to effectively utilize digital technologies, thereby fostering greater digital inclusion and socioeconomic participation (Singh, n.d.). Implementing programmes like the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) to enhance digital literacy among rural populations, especially marginalized groups.
4. Smart Village Projects: These projects integrate various digital solutions, such as e-governance, smart agriculture, and remote healthcare, to create technologically advanced and sustainable rural communities, thereby demonstrating the tangible benefits of digital integration (Reena Devi, 2025). Initiatives taken under the smart village project include SVAMITVA Scheme, Vibrant Villages Programme - II (VVP - II), Model Carbon Positive Eco Village (Phayeng), Drink from Tap Mission (Akhui Village), Tribal Village Vision 2030 (Adi Karmayogi Abhiyan), 100% Computer Literate Villages (Mangaal Rural).

Infrastructure development of Urban Areas in Manipur:

1. RoW Manipur: RoW policy was formed in 2019 for Mobile Towers, OFC and Telecom Infrastructure" ease the implementation of overground (Mobile Towers) and underground (OFC) infrastructure establishments in the state and simplify the whole process of applying, approval and installation of the infrastructure across the state to provide a network through OFC to every house up to remote Villages/Gram Panchayats.
2. Promotion of Digital Payments: Manipur is making significant strides in enhancing its digital payment infrastructure through the Department of Information Technology and various state-led initiatives. These efforts are centered on promoting the use of the BHIM app, expanding the deployment of PoS terminals. Manipur will soon adopt cashless transport payments and electronic Driving Licences (eDL) and Registration Certificates (eRC). From 18 July 2025, payments can be made via POS, UPI, cards, and online. From 1 August 2025, citizens can use digital DLs and RCs through DigiLocker and mParivahan apps, replacing physical documents (Manipur Update, 2025)
3. Digital Manipur Mission: The Digital Manipur Mission aims to enhance governance and uplift living standards through technological innovations. An important initiative is the e-District (Mission Mode Project). The e-District Mission Mode Project is designed to support the fundamental administrative unit, known as the "District Administration," in developing

Government-to-Citizen (G2C) services. This initiative aims to effectively utilize Information Technology Infrastructure to deliver these services directly to citizens at their homes.

4. Smart City Projects: These projects incorporate advanced digital technologies for urban planning, traffic management, waste management, and public safety, enhancing overall urban efficiency and quality of life. Imphal has completed 17 of 24 projects under the Smart City Mission, with the remaining seven scheduled to finish by August 2025. The city was selected in 2016 during the Fast Track Round of the national urban development initiative and was allocated Rs 550 crore in funding (Aparmita, 2025)

Policy Implementation Gaps and Challenges:

1. Inadequate Infrastructure Investment: Infrastructural deficit is one of the most important factors hindering the growth and development of the NER of India (Singh & Ningthoujam, 2023). "Inadequate internet infrastructure and connectivity in rural and remote areas limit digital access for many residents". (MANIPUR Vision 2047, n.d.)This challenge is exacerbated by the often-limited revenue-generating potential in less developed regions, which disincentivises private sector investment in robust network infrastructure(Parsheera, 2022). Furthermore, a lack of technical expertise among local populations and an underdeveloped start-up ecosystem further impede the expansion and maintenance of digital infrastructure(Pulla & Sc, 2024).
2. Limited Digital Literacy and Connectivity: In 2022, internet penetration in rural areas reached only 39%, in stark contrast to 111% in urban areas. Roughly one in ten villages' lacks mobile network coverage, and merely 42% of rural households have access to wireless internet. The state generally suffers from low digital literacy and a stark rural-urban digital divide: in 2020, just 43% of rural households had at least one member skilled in internet use, versus 84% in urban households(Raja, 2023)
3. Conflict and socio-political instability: The persistent conflict in Manipur has significantly disrupted the development and upkeep of digital infrastructure, resulting in repeated internet shutdowns and impeding digital inclusion efforts. In response to outbreaks of violence, Manipur enforced a statewide internet shutdown, the longest in India's Northeast region and the most prolonged in 2023, exceeding 100 days, which disrupted the state's digital economy and greatly restricted citizens' access to vital online services, thereby hindering comprehensive digital inclusion and economic development efforts.
4. Economic and financial barriers: The high cost of digital devices and internet services, coupled with low disposable incomes in rural areas, creates significant affordability challenges for widespread digital adoption (Rajagopalan & Sriram, 2020). This economic disparity further exacerbates the digital divide, limiting access even when infrastructure is theoretically available(Prasetyani et al., 2024). The development of a local digital innovation and entrepreneurship ecosystem is hindered by weak infrastructure, a lack of skilled workers, and low levels of digital literacy. Many elements necessary to developing an enabling environment for the digital economy are missing, from funding to facilities (Raja, 2023)

Results:

The digital infrastructure gap between urban and rural areas in Manipur is primarily due to insufficient funding for rural telecommunications, significant geographical challenges that arises from the state's hilly terrain, and socio-economic factors such as low digital literacy and affordability barriers. This disparity is further worsened by ineffective government policy implementation, lack of participation by local stakeholders, and less emphasis given on rural connectivity within existing policy frameworks. However, various opportunities to address this divide through targeted government initiatives are present, expanded mobile network coverage, and the promotion of robust public-private partnerships. To make use of the effectiveness of these opportunities, a coordinated approach is required to resolve the underlying structural issues and improving digital literacy across diverse population groups, thereby ensuring equal access and effective utilization of digital resources.

Discussion:

These findings highlight the complex and multifaceted nature of the urban-rural digital infrastructure divide in Manipur. The geographical challenges including difficult terrain, requires a specific structural technological solutions and targeted investments that address these specific conditions. However, infrastructure improvements alone are insufficient; socio-economic barriers such as digital literacy and affordability must be simultaneously addressed through complementary educational and financial support programs to ensure meaningful digital access. The observed policy implementation gaps underscore the importance of effective governance and active participation of local stakeholders to translate policy frameworks into practical outcomes. Although government initiatives and increased mobile penetration indicate progress toward digital inclusion, sustained efforts and scaling of these programs are critical to fully bridge the divide. Public-private partnerships represent a strategic approach to mobilize additional resources, expertise, and innovation, potentially accelerating infrastructure deployment in rural areas. Ultimately, closing this digital divide is essential to promote equitable socio-economic development in Manipur by enhancing access to education, healthcare, governance, and economic opportunities, thereby fostering inclusive growth and digital empowerment across the state.

Strategies for bridging the digital infrastructure gap in Manipur:

i) Expand fibre optic networks and mobile broadband in rural and remote areas to improve access.

ii) Promote public-private partnerships for sustainable telecom infrastructure in underserved areas.

iii) Offer government subsidies and incentives to attract private investment in rural digital infrastructure.

iv) Launch digital literacy programs for all ages and groups, focusing on schools and community centres.

v) Tackle power supply, connectivity policies, and socio-economic gaps to build equitable digital infrastructure in Manipur.

vi) Build a reliable, affordable electricity supply for digital devices and telecom equipment in rural areas.

Conclusion:

The persistent digital infrastructure divide between urban and rural areas in Manipur presents significant challenges rooted in geographical, economic, and policy-related factors. Despite these obstacles, ongoing government initiatives, increasing mobile device penetration and potential public-private partnerships offer promising avenues to bridge this gap. Addressing infrastructural deficits and enhancing digital literacy in rural regions are essential to ensure equitable access to education, healthcare, governance, and economic opportunities. This study underscores the importance of coordinated efforts among policymakers, stakeholders, and communities to foster a digitally inclusive environment that supports the socio-economic development of Manipur. Future research and policy formulation should build on these findings to create sustainable solutions tailored to the region's unique needs.

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