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Empowering Rural Women through AI: A Sociological Study from Kalyana Karnataka

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ABSTRACT

This article presents a sociological inquiry into the interface between artificial intelligence (AI) and the empowerment of rural women in the Kalyana Karnataka region (formerly Hyderabad Karnataka). Drawing on secondary literature and illustrative field-based insights, the study argues that AI, when embedded in local-level support systems, can reshape rural women's access to education, livelihoods, health services, and civic participation. Yet, its benefits are heavily mediated by caste, class, gender norms, digital literacy, and infrastructural constraints. The analysis shows that while AI-enabled ICT platforms can enhance women's agency, autonomy, and economic independence, they may also reproduce digital inequality if not grounded in inclusive, community-centred design. The paper concludes by advocating for human-centred AI-governance frameworks that integrate Self-Help Groups (SHGs), women-centric NGOs, and local governance institutions in Kalyana Karnataka.

Introduction

Artificial intelligence has emerged as one of the most transformative technological forces of the 21st century, fundamentally reshaping labor markets, educational systems, healthcare delivery, agricultural practices, and social relations globally. In India, AI's penetration extends beyond metropolitan tech hubs like Bengaluru and Hyderabad into rural communities, where it promises to address longstanding development challenges while simultaneously creating new forms of economic

opportunity. However, the intersection of AI with gender, regional inequality, and rural geography produces complex, contradictory outcomes that demand rigorous sociological investigation, particularly in historically marginalized regions.

Kalyana Karnataka, formerly known as Hyderabad-Karnataka, represents one of India's most socio-economically backward regions. Renamed in 2019 by Chief Minister B.S. Yediyurappa as a tribute to 12th-century social reformer Basavanna (with "Kalyana" meaning welfare), the region comprises seven districts: Bidar, Kalaburagi, Yadgir, Raichur, Koppal, Ballari, and Vijayanagara. Out of Karnataka's 39 most backward taluks, 26 are in northern Karnataka, and of the 31 taluks in Kalyana Karnataka, 28 are classified as backward with 21 being "most backward". The region's Human Development Index (HDI) values reflect deep disparities: Raichur (0.410), Kalaburagi (0.404), Yadgir (0.397), and Bidar (0.393) register among Karnataka's lowest, alongside elevated Gender Inequality Index (GII) values.

Women in Kalyana Karnataka face compounded disadvantages due to gender, regional backwardness, and often caste marginalization (SC/ST comprising 39% of population). Traditional challenges include low female literacy rates, restricted mobility, limited non-agricultural employment opportunities, poor nutrition, early marriage prevalence, and inadequate healthcare access. The region's economy traditionally relies on rain-fed agriculture (primarily jowar, bajra, and turmeric), livestock rearing, seasonal migration to Gulf countries and urban centers, and artisanal work.

Over the past three years, Kalyana Karnataka has witnessed unprecedented technological interventions. The Karnataka government's skill development program announced in October 2025 aims to train 25,000 rural women entrepreneurs across districts including Belagavi and Vijayapura, with plans to extend to Kalyana Karnataka. Telangana's neighboring "Project Sanmati" initiative (launched December 2024) demonstrates the region's potential for AI-enabled employment, engaging 2,400 women from self-help groups in data annotation work earning up to ₹2,000 per completed AI task. Additionally, SHGs in Kalyana Karnataka have undergone rapid digital transformation, with 60% now using digital payment systems compared to 15% in 2019.

This transformation raises critical sociological questions: How does AI-mediated work reshape gender roles and women's agency in historically backward Kalyana Karnataka? What structural barriers unique to this region limit women's access to AI benefits? How do caste, class, education, and regional underdevelopment intersect with gender to produce differential outcomes? What role do SHGs play as scaffolding for AI adoption? And what policy interventions can maximize AI's empowerment potential

while mitigating risks in this marginalized region?. The significance of this study lies in its temporal and geographic specificity. As India positions itself as a global AI leader with the IndiaAI Mission investing ₹10,371 crore and Karnataka's Minister Priyank M. Kharge outlining visions extending beyond Bengaluru's tech towers to rural areas understanding how these technologies affect marginalized populations becomes urgent. Kalyana Karnataka's women, who traditionally face compounded disadvantages due to gender and geographic exclusion from development, may either become beneficiaries of AI-driven inclusion or bear disproportionate burdens through exploitative labor conditions without adequate safeguards.

This research contributes to four scholarly domains: (1) feminist technology studies examining how gender and region shape and are shaped by technological systems; (2) rural development literature analyzing technology's role in addressing regional inequality; (3) Indian sociology investigating how Article 371J's special status for Hyderabad-Karnataka has influenced women's empowerment outcomes; and (4) critical AI studies exploring algorithmic bias, data labor, and the global south's position in AI supply chains.

Kalyana Karnataka a cluster of six districts in northern Karnataka (Bagalkot, Vijayapura, Bidar, Yadgir, Raichur, and Kalaburagi) is historically marked by socio-economic backwardness, agrarian distress, and deeply entrenched gender and caste hierarchies. In this context, rural women often occupy the margins: they perform unpaid agricultural and domestic labour, face restricted mobility, and have limited access to formal education, credit, and public services. Recent years, however, have seen a growing policy and NGO push to integrate Information and Communication Technologies (ICTs) and, increasingly, AI-driven tools into rural development programmes, with the stated goal of “empowering” women economically and socially.

From a sociological perspective, “empowerment” is not merely the provision of technology but a process through which women enlarge their capability to make meaningful choices, negotiate power structures, and participate in decision-making at household, community, and institutional levels. Artificial intelligence as embodied in mobile-based apps, voice-assisted services, chatbots for government schemes, and algorithm-driven financial-inclusion platforms can, in principle, compress information asymmetries, reduce transaction costs, and magnify women’s voice and visibility. At the same time, AI risks deepening existing inequalities if it upholds dominant gender and caste scripts, ignores local epistemic practices, or bypasses village-level social networks. This article situates AI within the lived realities of rural women in Kalyana Karnataka. It examines how AI-enabled tools are being appropriated

or resisted in everyday life, how they interact with traditional kinship-based power relations, and what kind of institutional architecture is needed to prevent AI from becoming another instrument of elite capture.

Review of Literature

Recent sociological and development-oriented studies point to a dual potential of digital technologies in rural India. On one hand, ICT-based interventions such as mobile banking, tele-health applications, and e-governance portals have been shown to improve rural women's access to health services, savings, and civic information. A Karnataka-specific study on rural women and digital media found that when women gain access to phones and social-media platforms, they begin to negotiate better, for instance, to demand education for their daughters, to participate in local meetings, or to seek redressal for entitlements.

At the same time, scholars emphasise that digital access is not gender-neutral. Caste, class, and patriarchy determine who owns devices, who can use them freely, and whose labour is mobilised to handle "AI-training" or content-moderation tasks. For example, several reports highlight how rural women in India are being recruited into low-paid, high-stress AI-content-moderation jobs, where they are exposed to graphic violence and hate speech without adequate mental-health safeguards. This "dark side" of AI employment reveals how women's labour can be instrumentalised to sustain global AI systems while leaving them emotionally and socially vulnerable.

Women-centric economic-empowerment programmes, especially those built around Self-Help Groups (SHGs), increasingly deploy digital tools and AI-assisted platforms for inventory management, voice-based training, and market linkage. A recent study on SHGs in Kalyana Karnataka notes that digital innovations—such as mobile-based accounting, QR-code-enabled branding, and online marketplace integrations—have strengthened women's control over collective finances and improved their bargaining power with local traders. Parallel work on AI and women empowerment at the national level suggests that AI can positively impact women's agency when it is embedded in supportive ecosystems involving mentorship, peer networks, and local-language interfaces.

What remains under-explored, however, is a systematic sociological analysis of AI's impact on rural women in a specific region like Kalyana Karnataka, where intersecting identities caste (Dalit, OBC, ST), religion, and landlessness shape women's relation to technology. This lacuna underscores the need for grounded, context-sensitive studies that treat AI not as a standalone "solution" but as part of a larger socio-technical field of power and resistance.

Research Methodology

This study adopts a qualitative, interpretive sociological framework, drawing primarily on secondary data from academic journals, policy documents, and field-based reports, supplemented by illustrative vignettes generated from public-domain case studies in Karnataka. The research is contextualised in the Kalyana Karnataka region, focusing on women engaged in agriculture, allied-sector work, SHGs, and informal micro-enterprises.

The conceptual orientation is informed by (a) the gender-and-development (GAD) framework, which foregrounds how technology interacts with gendered roles and power relations; (b) Amartya Sen's capability approach, which treats empowerment as the expansion of real choices and freedoms rather than income alone; and (c) the socio-technical-ecosystem perspective, which views AI as embedded in infrastructures, institutions, and community practices.

Results and Findings

1. Access, literacy, and the digital divide: The literature indicates that digital literacy and device ownership remain uneven across rural women in Kalyana Karnataka. In many households, mobile phones are controlled by male members, and women use them conditionally for example, to receive Aadhaar-linked welfare notifications or to access WhatsApp groups run by SHGs. AI-driven apps that rely on voice input or text-based interfaces often presuppose a level of comfort with English or Hindi that many rural women do not possess, thereby reinforcing a language-based digital divide. However, recent government and NGO-led efforts have begun to bridge this gap. For instance, extensions of national digital-literacy missions into Karnataka have trained select women "digital champions" who conduct neighbourhood-level sessions on basic smartphone use, government-service portals, and simple AI tools (e.g., chatbots for grievance redressal). These local-level intermediaries often belong to SHGs or women's collectives, enabling them to translate AI-related information into Kannada and local dialects, thereby enhancing comprehension and trust.

Nevertheless, structural barriers persist: limited electricity, poor internet connectivity, and social norms discouraging women's independent mobility still constrain sustained AI engagement. The result is a "partial inclusion"women may be exposed to AI-assisted services, but their participation is often mediated, monitored, or constrained by male kin or community gatekeepers.

2. AI-enabled livelihoods and economic empowerment: Several studies show that AI-assisted tools can enhance rural women's economic independence when they are aligned with existing livelihoods. In

Kalyana Karnataka, women in SHGs and micro-enterprises such as tailoring units, home-based food-processing units, and small-scale agri-processing have begun using AI-integrated platforms for tasks like:

- Voice-enabled accounting apps that automatically record sales and expenses.
- WhatsApp-based or low-code platforms that automate order tracking, reminders, and basic customer communication.
- AI-driven design tools that help artisans experiment with new patterns or packaging while retaining local motifs.

Such tools reduce the cognitive load of manual bookkeeping and enable women to visualise profit margins, plan bulk purchases, and negotiate better with suppliers. A recent study on SHGs in Kalyana Karnataka notes that technology-enabled record-keeping has improved transparency in collective finances and reduced dependence on external male intermediaries who previously handled money and documentation.

Moreover, AI-powered market-linkage platforms can connect women-led production units with urban buyers, e-commerce aggregators, or government-sponsored procurement programmes. For example, data-driven supply-chain systems that use satellite imagery and yield-prediction algorithms can help women farmers access fair-price procurement or insurance schemes, thereby lowering risk and improving income stability.

3. Gendered power relations and domestic space: The introduction of AI-assisted technologies also reshapes intra-household power dynamics, though not always in a uniformly progressive direction. In many households, men initially view phones and digital training as "idle" or "risky" for women, suspecting that they will be used for social media, gossip, or "unregulated" communication. Over time, when the economic usefulness of AI-enabled tools becomes evident (e.g., higher income from SHG sales or better management of government benefits), resistance may decrease and men may even support device use provided they retain oversight. However, this can create a double bind: women gain greater economic agency but face tightened surveillance through shared accounts, restricted app access, or monitoring of online activity. Some women report that they must negotiate daily permissions to use phones for business calls or to respond to orders, while men decide which platforms or apps are "acceptable."

At the same time, in families where women become the primary users of AI-assisted services, subtle shifts in authority can occur. For instance, a woman who reliably tracks welfare schemes, subsidy applications, or land records through AI-driven portals may emerge as the household's "information manager," thereby increasing her bargaining power in decisions about schooling, health care, or investments. Sociologically, this reflects a re-negotiation of gendered roles where instrumental competence with technology begins to challenge traditional notions of women as passive or apolitical.

4. Social participation and civic engagement: Beyond the household and marketplace, AI-enabled communication channels can also influence women's civic participation. Social-media groups and voice-based noticeboards run by women's collectives allow rural women in Kalyana Karnataka to:

- Share information about government schemes, health camps, and grievance-redressal mechanisms.
- Report encroachments, harassment, or service failures anonymously or semi-anonymously, reducing the fear of social stigma.
- Mobilise collective petitions or demonstrations around issues such as water scarcity, land rights, or access to education.irjms+1

AI-driven translation and voice-based tools can be particularly significant in a region marked by linguistic diversity, where women may not be fluent in English or official Hindi/Kannada but can communicate in local Tulu or Marathi-influenced dialects. When AI interfaces accommodate these dialects, women who previously felt excluded from formal bureaucratic discourse can begin to articulate their claims in a language that feels familiar and legitimate.

However, civic participation mediated by AI is also constrained by digital-divide factors such as low literacy, weak connectivity, and the risk of online harassment. Some women withdraw from digital spaces after experiencing trolling, misrepresentation, or the misuse of personal photos or details, underscoring the need for safer, women-centred digital commons.

Conclusion

The sociological evidence suggests that AI holds significant, yet conditional, promise for empowering rural women in Kalyana Karnataka. When AI tools are embedded in strong community-based support systems such as SHGs, women-centric NGOs, and local-government units they can enhance digital literacy, expand livelihood opportunities, and strengthen women's voice in households and public arenas.

However, AI is not a neutral or self-fulfilling technology. Its impact is shaped by pre-existing structures of caste, class, and gender, and by infrastructural realities such as electricity, connectivity, and device ownership. Without deliberate design for inclusion, AI can reproduce or even intensify inequality by privileging tech-savvy women, relying on precarious content-moderator labour, or bypassing the knowledge and practices of marginalised communities.

For Kalyana Karnataka, a human-centred AI-governance vision would:

- Integrate AI-skilling programmes within existing women's collectives and SHG federations.
- Prioritise local-language, voice-based, and low-literacy interfaces.
- Ensure robust data-privacy safeguards and mental-health support for women engaged in AI-related digital work.
- Link AI-driven platforms with local governance institutions (gram panchayats, taluk-level development offices) to ensure accountability and redress.

In this way, AI can become a sociological resource for empowerment less as a top-down technological fix and more as a co-produced tool that amplifies women's agency, strengthens collective action, and challenges entrenched hierarchies in rural Karnataka.

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