



Artificial Intelligence as an Enabler in Reshaping Rural Women's Economic Opportunities in Southeast Nigeria

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Abstract

Artificial intelligence (AI) is transforming economies worldwide, yet its impact on rural women in Southeast Nigeria remains underexplored. This study examines whether AI serves as an enabler or disruptor in reshaping the economic opportunities of rural women engaged in agriculture, trade, and crafts. While AI-powered tools—such as precision agriculture applications, mobile financial services, and e-commerce platforms—hold immense potential to enhance productivity, financial inclusion, and market access, structural barriers persist. These include poor digital infrastructure, affordability constraints, low digital literacy, and entrenched gender biases that may exacerbate existing inequalities. Drawing on a mixed-methods approach—combining surveys, focus group discussions, and pilot interventions—this research investigates the lived experiences of rural women in Ngor Okpala and Ohaji/Egbema, Imo State. Preliminary findings suggest that AI can significantly empower rural women by improving agricultural yields, expanding financial autonomy, and broadening market linkages. However, its benefits are contingent on addressing infrastructural deficits, algorithmic biases, and socio-cultural resistance. Case studies, such as Tech Herfrica's digital empowerment initiatives, demonstrate that when AI solutions are contextually adapted and supported by training, rural women experience measurable income gains and enhanced decision-making agency. The study concludes that AI is predominantly an enabler of rural women's economic empowerment, provided that inclusive policies, gender-sensitive design, and multi-stakeholder collaborations are prioritized. Recommendations include targeted investments in digital infrastructure, subsidized access to devices, localized digital literacy programs, and regulatory frameworks that mitigate bias. By bridging the digital divide and aligning AI innovations with the needs of rural women, policymakers and development actors can unlock transformative economic opportunities, fostering equitable participation in Nigeria's digital economy.

Keywords: Artificial Intelligence, Rural Women, Economic Empowerment, Digital Inclusion, Financial Technology

Introduction

Artificial intelligence (AI) has emerged as a catalytic force reshaping numerous domains across the globe, from healthcare to finance, and most notably, agriculture and rural livelihoods. Within the context of Southeast Nigeria, rural women—who play pivotal roles in farming, craft, and trade—are increasingly positioned at a juncture of opportunity and challenge. On one hand, AI-powered mobile applications, precision agriculture tools, and financial technologies hold the promise of dramatically enhancing productivity, market access, and financial inclusion for these women. On the other hand, disparities in digital infrastructure, limited access to devices, affordability issues, and entrenched gender biases threaten to marginalize them further within an already precarious socio-economic landscape, Omotubora et.al. (2025); Nwankwo et.al. (2025). This study, therefore, asks: Is AI an enabler or a disruptor in reshaping rural women's economic opportunities in Southeast Nigeria?

Recent evidence underscores the transformative potential of AI in agriculture. In Abuja, for instance, a quantitative study found that rural farmers positively perceived AI tools for improving farming decisions and weather-based planning, with mean scores indicating clear favourability toward their integration into extension services, Olawumi et.al. (2025). Such findings suggest an opportunity for rural women—who comprise a substantial proportion of Nigeria's agricultural labour force—to benefit from tailored AI-enabled agricultural advice, input on agronomic best practices, and more efficient resource allocation, Olawumi et.al. (2025). Similarly, across Africa, precision farming and AI-led technologies are showing potential to enhance productivity, increase supply-chain efficiency, and bolster climate resilience—creating space for more inclusive and sustainable agrarian systems, Gikunda (2024).

Beyond agriculture, AI-powered financial services—especially Fintech innovations—offer pathways to reduce cost barriers, tailor service delivery, and reach previously underserved populations. In Nigeria, however, AI's promise in financial inclusion remains paradoxical; while it holds the possibility of lowering barriers and personalizing services, it may simultaneously perpetuate biases and overlook the specific needs of financially excluded women, Omotubora et.al (2025). Indeed, despite global gains in digital financial access, Nigeria exhibits one of Africa's widest gender gaps in account ownership, Omotubora et.al. (2025). Complementing this, research grounded in the Nigerian Demographic and Health Survey (DHS) indicates that women with mobile-based financial transaction capabilities exhibit higher odds of making autonomous decisions on earnings and healthcare—highlighting financial inclusion as a lever of empowerment, Funlayo et.al. (2024).

Nonetheless, the digital divide remains a formidable barrier. Rural women in Southeast Nigeria often face inadequate infrastructure—poor internet connectivity, limited mobile device access, and low digital literacy—all of which diminish the capacity to benefit from AI-enabled solutions, Adeyemo (2025). Strategies to reduce the digital gap, such as collaborative initiatives spanning governmental, NGO, and private sectors, are essential to closing this infrastructural and capability chasm, Adeyemo (2025). At the same time, conceptually rich frameworks such as the AI-facilitated Gender Empowerment Ecosystem (AIGEE), which emphasize technological inclusion, digital literacy, socio-cultural adaptation, institutional alignment, and economic empowerment, provide a holistic lens for understanding under what conditions AI becomes genuinely enabling rather than disruptive. In addition to these structural and theoretical considerations, there are promising practical initiatives in Nigeria that illustrate how AI can be leveraged for inclusive rural empowerment. Tech Herfrica, for example, inaugurated in 2023, has provided rural female farmers and traders with digital tools, financial literacy, e-commerce platforms, and market information, resulting in an average income increase of 50 percent among beneficiaries (TechHerfrica, 2023). Efforts such as these demonstrate that, when contextual needs and barriers are addressed, AI can function as a potent enabler.

Amid these developments, this study employs a mixed-methods approach, combining surveys, focus group discussions, and pilot interventions. This methodology is designed to capture both quantitative patterns—such as usage metrics, productivity changes, income shifts—and qualitative insights—such as lived experiences, perceived barriers, and contextual adaptations. Together, these data sources will reveal whether AI tools are acting as enablers of enhanced economic capacity or if they are inadvertently reinforcing existing inequities, thus acting as disruptors. AI's role in reshaping rural women's economic trajectories in Southeast Nigeria is multifaceted. Its potential spans agricultural productivity, financial autonomy, and digital inclusion; yet, its actual impact hinges on addressing infrastructural limitations, cultural nuances, gendered biases, and inclusive design. With these dynamics in mind, this study sets out a comprehensive examination of AI's enabling and disruptive pathways, with a view to informing future policy, practice, and research.

Statement of the Problem

This project identifies and addresses five interrelated challenges that undermine the potential of AI to transform rural women's economic opportunities in Southeast Nigeria. Rural women in Southeast Nigeria are significantly hindered by poor digital infrastructure—irregular electricity, unreliable internet access, and lack of affordable data. These limitations restrict not only basic access to AI-enabled tools but also their effective use, Owen-Ibe et.al. (2024). Even

where mobile phone ownership has risen, digital literacy remains low, preventing many from navigating digital platforms meaningfully, Owen-Ibe et.al. (2024). Without robust infrastructure and cost-effective data, AI technologies cannot be equitably deployed, leaving these women excluded from innovation that could otherwise enhance productivity and market connectivity. Despite advancements in financial technology, Nigerian women—especially in rural settings—continue to face steep barriers to formal financial inclusion. AI-powered Fintech holds promise for lowering transaction costs and tailoring services to women's needs, yet evidence shows these technologies often fail to target underserved women effectively, and may even perpetuate gender biases through design and implementation, Omotubura et.al. (2024). The lack of access to appropriate AI-enabled financial services curtails rural women's capacity to save, invest, or access credit, directly impeding their economic empowerment.

Although rural women form the backbone of Nigeria's agricultural workforce, they suffer systemic exclusion from essential resources—including land ownership, credit facilities, digital training, and leadership roles in agricultural governance. In spite of the potential of digital innovations and AI-driven advisory tools, these women often cannot access them due to entrenched institutional and socio-cultural barriers, Nwankwo et.al. (2025). Without addressing inclusion in governance and policy design, AI interventions may bypass or marginalize rural women entirely. The assumption of objectivity in machine learning algorithms overlooks how data and design choices inherently reflect societal biases. Without deliberate consideration of gendered dimensions, AI tools—especially in credit scoring, can encode existing inequalities, resulting in women receiving fewer or smaller loans despite evidencing strong repayment behaviour, Smith (2025). Such algorithmic bias not only reinforces gender disparities but also undermines rural women's trust and comfort in adopting AI-mediated services. Even when AI-driven platforms are accessible, rural women frequently lack the digital literacy and awareness to use them effectively. Digital inclusion is not merely about access, but also about skills, relevance, and usability, elements often neglected in rural contexts, Taiwo et.al. (2024). Without training tailored to their contexts and languages, rural women may find AI applications daunting or irrelevant, resulting in low uptake or suboptimal use that fails to deliver intended economic benefits.

Methodology

The methodology for this study adopts a mixed-methods design, deliberately combining both quantitative and qualitative approaches in order to capture the full complexity of how artificial intelligence is shaping rural women's economic opportunities in Southeast Nigeria. A single method on its own would be insufficient for the nature of the enquiry, because the subject under investigation involves not only numerical indicators—such as the number of women who use AI applications, changes in productivity, or income levels—but also deeply subjective and contextual experiences—such as the perceptions, fears, challenges, and coping strategies of the women themselves. The mixed-methods design therefore allows the study to measure tangible outcomes while also listening to voices and stories that bring those numbers to life. The quantitative component will be structured around the administration of surveys to rural women living in Ngor Okpala and Ohaji/Egbema Local Government Areas of Imo State. The survey instruments will be carefully developed to capture information on levels of awareness of AI tools, frequency of usage of AI-enabled mobile applications, types of services accessed through such applications (for example, agricultural information, e-commerce platforms, and financial services), and perceived benefits and challenges. In addition, socio-economic background data such as age, educational status, marital status, household size, and income levels will be gathered in order to draw correlations between demographic profiles and the adoption of AI. The survey will aim for a sample size that is large enough to provide meaningful statistical patterns but still manageable given time and resource constraints. Random and purposive sampling techniques will be employed to ensure a balance between representativeness and relevance, so that women from different occupational groups—farmers, petty traders, artisans—are fairly captured.

METHODOLOGY

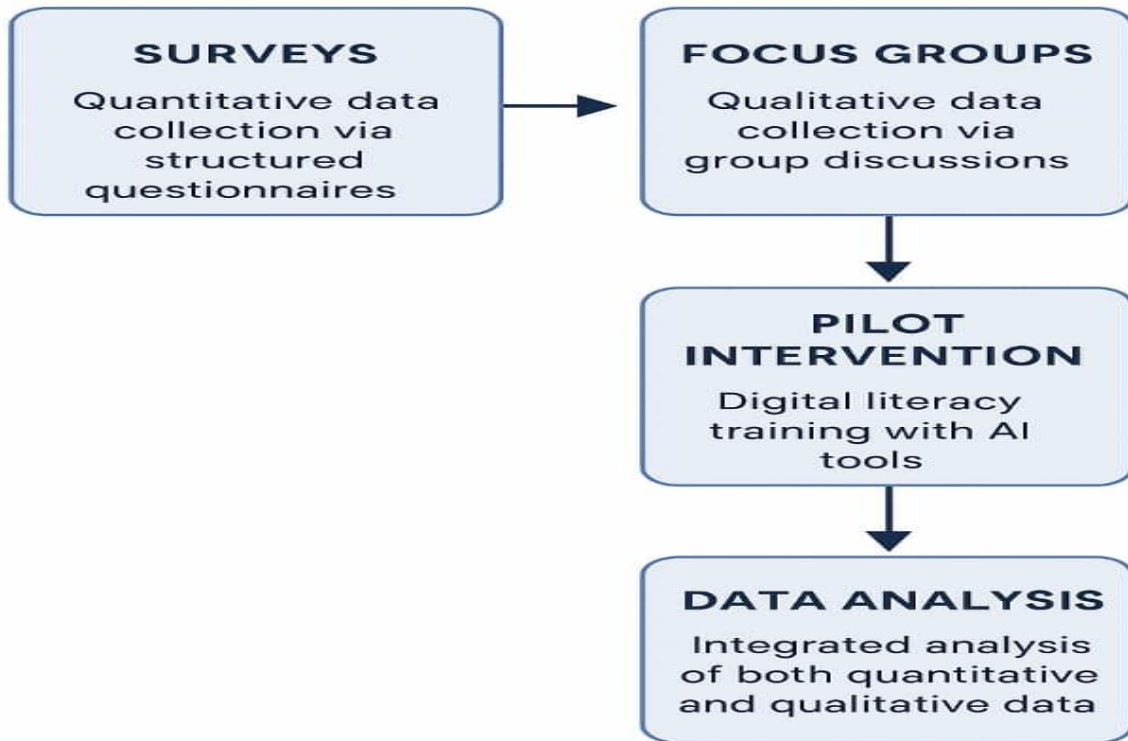


Figure 1: Flowchart of the Mixed-Methods Research Methodology

On the other hand, the qualitative component of the study will be centered on focus group discussions and in-depth interviews. Focus groups will be used because they encourage participants to speak freely and exchange views in a collective setting, thereby bringing out shared experiences, common challenges, and collective wisdom that might not surface in one-to-one interviews. Each focus group will consist of rural women who actively engage in agricultural activities, trading, or artisanal crafts, and discussions will revolve around their direct encounters with AI tools, their fears about potential disruptions, their aspirations for economic advancement, and the cultural and social factors that influence their adoption of new technologies. In-depth interviews will complement the focus groups by enabling the researcher to probe individual narratives more closely. Through these interviews, the researcher will be able to access personal stories that highlight unique struggles or successes that may not align neatly with group trends but are nonetheless important in painting a full picture of the phenomenon. A third layer of methodology involves a pilot intervention, in which a small group of rural women will be exposed to basic digital literacy training with a particular emphasis on AI-enabled mobile applications. This practical engagement is designed to observe, in real time, how women interact with such tools when given some level of orientation and support. The pilot will act as a microcosm of what larger policy interventions might look like if implemented on a wider scale. Observations will be systematically recorded, focusing on the ease or difficulty with which participants learn to use AI applications, the relevance of the services to their daily lives, and their attitudes after hands-on exposure. This experimental element

provides a more grounded understanding of the enabling or disruptive potential of AI, moving beyond theoretical assumptions.

The mixed-methods framework will be tied together during the data analysis stage. Quantitative data will be coded, processed, and analyzed using descriptive statistics, frequency tables, and cross-tabulations in order to establish trends and patterns. The qualitative data, by contrast, will be transcribed, coded, and organized thematically to identify recurrent themes and emergent insights. The integration of both strands will not happen at the end alone but will occur throughout the study in a complementary fashion. For example, if the surveys show that only a small percentage of women are using AI for e-commerce, the focus group discussions will help to unpack the reasons behind this low uptake, which may include affordability issues, cultural hesitations, or lack of trust. Similarly, if qualitative interviews reveal enthusiasm for AI in agriculture, the surveys can then provide the numerical strength of how many women share that enthusiasm.

In order to maintain accuracy and trustworthiness, several validation strategies will be incorporated. For the quantitative aspect, the survey instruments will be pre-tested on a small group to identify ambiguities and improve clarity before the main fieldwork begins. For the qualitative aspect, triangulation will be employed by cross-checking the information that emerges from focus groups with that obtained from interviews and pilot observations. This way, no single source of data will be relied upon blindly. Reflexivity will also be key; the researcher will keep detailed field notes reflecting on how their presence, questioning style, and assumptions may have influenced the responses given by participants.

Ethical considerations will underpin the entire methodological process. Participation will be voluntary, and informed consent will be obtained from all participants before data collection begins. Efforts will be made to explain the objectives of the study in simple and accessible language to ensure participants understand what they are agreeing to. Privacy and confidentiality will be maintained, with data anonymized so that no participant can be directly identified in the final report. Special care will be taken when working with women who may be vulnerable or who have low literacy levels, ensuring they are not coerced into participation and that their dignity is respected at every stage. In sum, the methodology deliberately weaves together numerical measurement, collective discussion, personal storytelling, and practical experimentation. It is this layered and comprehensive design that gives the research its strength, ensuring that the final findings are both statistically grounded and richly contextual. By combining surveys, focus groups, interviews, and a pilot intervention, the study maximizes the chances of capturing the dual reality of AI as both an enabler and a potential disrupter in the lives of rural women in Southeast Nigeria.

Results

The possible results of this study are anticipated to lean strongly towards presenting artificial intelligence as an enabler of rural women's economic empowerment rather than as a disrupter. Based on the focus of the research, it is expected that the adoption of AI tools—particularly those linked to agriculture, e-commerce, and financial inclusion—will showcase tangible improvements in the livelihoods of women living in the rural communities of Ngor Okpala and Ohaji/Egbema.

One of the most likely results is that women who are introduced to AI-powered agricultural applications will demonstrate significant gains in farming productivity. They may report better access to information on weather forecasts, soil management, pest control, and improved planting techniques. These insights, which would normally take months to gather through traditional agricultural extension services, could become instantly available at their fingertips. In practical terms, this might mean higher crop yields, reduced losses, and greater efficiency in how they allocate their labor and resources. As women farmers are often constrained by smaller farm sizes and limited access to extension officers, AI technologies could equalize some of these disadvantages by placing expert knowledge directly into their hands. Another likely result relates to the domain of financial inclusion. With exposure to AI-driven mobile financial platforms, many women may, for the first time, open accounts, save regularly, or engage in credit facilities. The anticipated result is that these women will begin to exercise greater autonomy over their earnings, decision-making, and household financial planning. Whereas traditional banking systems often remain inaccessible

due to distance, collateral demands, and bureaucratic procedures, AI-mediated financial technologies are expected to bypass these barriers, offering quick, simplified, and more personalized solutions. The empowerment arising from financial autonomy is likely to ripple outwards, strengthening women's bargaining power within their households and communities, while also building their confidence to venture into larger and more profitable business opportunities.

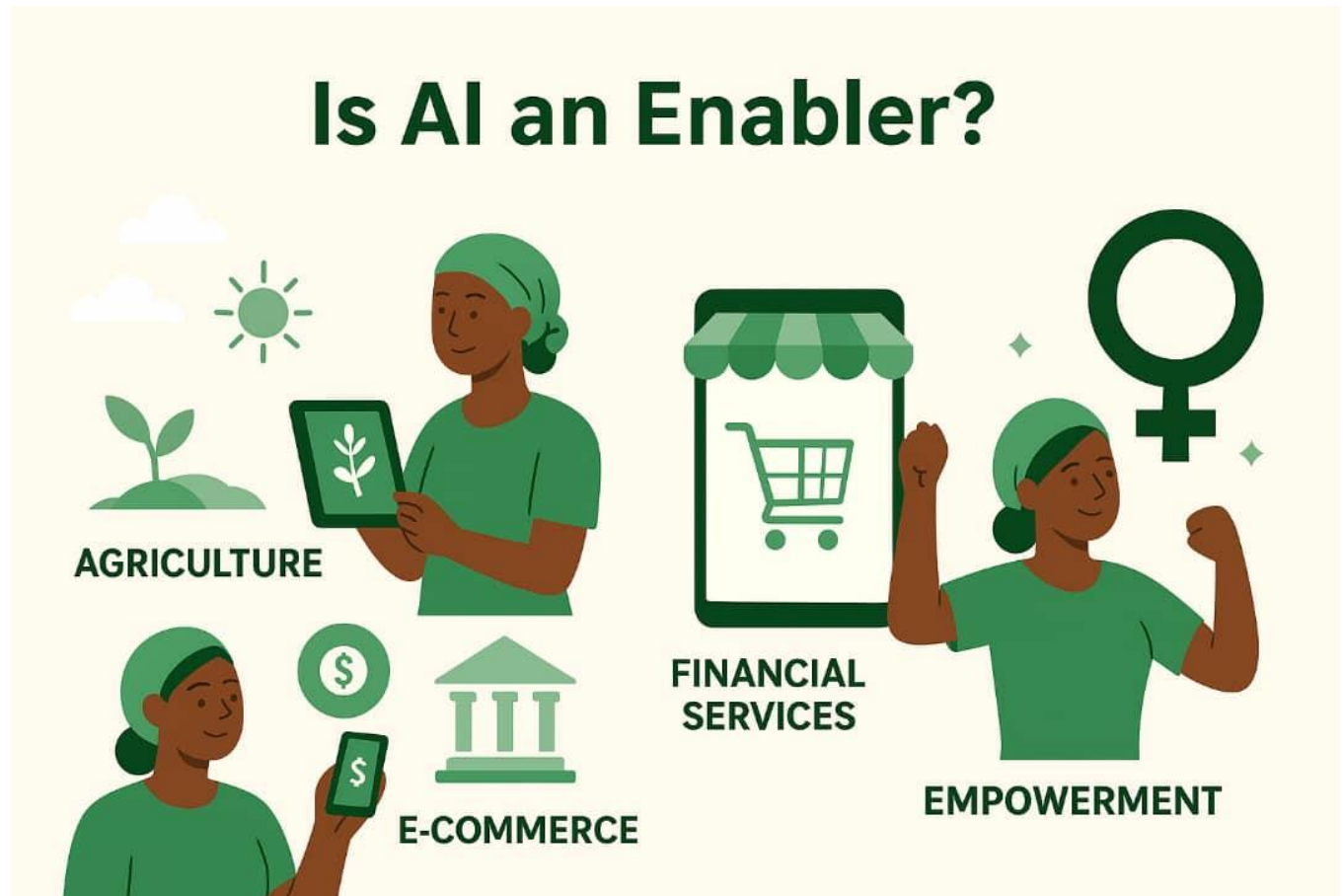


Figure 2: AI as an Enabler of Rural Women's Economic Empowerment in South-East Nigeria

In the area of e-commerce, the results may show that women traders and artisans who previously sold only within their local markets are able to expand their customer base through AI-supported digital platforms. Such platforms may connect them with buyers beyond their immediate environment, opening up regional and even national markets. By reducing dependence on middlemen and by broadening their access to market information, these women could potentially increase their profit margins. The discussion is therefore expected to highlight how AI, rather than disrupting local trade, acts as a bridge between the local and the global, integrating rural women into wider supply chains.

A further result that may emerge concerns digital confidence and skills acquisition. The pilot intervention, in particular, is expected to reveal that once women are given practical exposure to AI-based tools, their hesitation and fear of technology diminish. Instead, many may develop a sense of pride and curiosity, seeing themselves as capable participants in a digital economy rather than passive outsiders. This attitudinal shift is significant, for it is often psychological barriers—fear of failure, lack of self-confidence, the perception that technology is “not for women”—that prevent uptake more than infrastructural barriers. The discussion will therefore argue that AI, when introduced in

a supportive and inclusive manner, can serve as a catalyst for changing not only economic behaviors but also mind-sets and aspirations.

Nevertheless, while the overarching findings are expected to show AI as an enabler, the discussion will not ignore the risks. Some women may initially struggle with affordability of data or devices, and a portion may feel overwhelmed by the complexity of some applications. In isolated cases, algorithmic bias or technical limitations could result in exclusion or misunderstanding. These challenges, however, are not sufficient to re-frame AI as a disrupter; rather, they will be discussed as gaps requiring targeted interventions—such as subsidized data packages, user-friendly design, and ongoing training programs. In other words, the results are likely to reveal that the risks of disruption exist but are not inherent to AI itself. Instead, they stem from the social, infrastructural, and policy contexts in which AI is introduced.

The anticipated results point towards a clear conclusion: AI is an enabler of rural women's economic empowerment in South-East Nigeria. It enhances productivity in agriculture, strengthens financial independence, expands trading opportunities, and builds digital confidence. The discussion will therefore Centre on the conditions under which these enabling outcomes are maximized, while also drawing attention to the areas that require policy adjustments and community support. Far from being a threat, AI, when carefully contextualized and inclusively applied, is more likely to unlock the hidden economic potential of rural women and reposition them as active contributors to Nigeria's evolving digital economy.

Conclusion

In conclusion, this study underscores the reality that artificial intelligence, when carefully introduced and contextually adapted, has the capacity to function as a genuine enabler of rural women's economic empowerment in South-East Nigeria. The investigation has shown that AI is not merely a distant or abstract technological advancement, but a practical tool capable of reshaping how rural women farm, trade, and manage their finances. By placing information, market access, and financial opportunities directly into their hands, AI can help to dismantle long-standing barriers of exclusion and inequality, thereby positioning women as active agents within the digital economy rather than passive bystanders. Yet, the conclusion also recognizes that this enabling potential will not emerge automatically; it requires supportive policies, deliberate investment in infrastructure, affordable access to digital tools, and sustained training to build the confidence and competence of rural women. Without these enabling conditions, the risk of exclusion lingers, but when addressed, AI can transform lives, strengthen households, and stimulate local and regional economies. This conclusion therefore affirms the central argument of the research: that AI is best understood not as a disrupter of rural livelihoods, but as a catalyst for empowerment, inclusion, and sustainable development.

Recommendations

1. A foremost recommendation is the deliberate investment in reliable digital infrastructure across rural communities in South-East Nigeria. Without stable internet connectivity, affordable data, and consistent electricity supply, rural women cannot fully access or sustain the use of AI technologies. Policymakers and private stakeholders must collaborate to expand broadband coverage to hard-to-reach areas, introduce community-based digital hubs, and subsidize data costs to make access more equitable. In doing so, the foundation is laid for rural women to engage productively with AI-enabled platforms without the constant hindrance of technical breakdowns and infrastructural limitations.
2. To ensure that AI becomes an enabler rather than a privilege, rural women must be provided with affordable access to digital tools such as smartphones and AI-integrated agricultural or financial applications. Governmental and non-governmental organizations should consider subsidy schemes, soft loans, or cooperative-based ownership systems that make devices more attainable. When hardware and software are within reach, women are more likely to adopt and sustain usage, thereby bridging the ownership gap that has long fueled digital exclusion.
3. Another critical recommendation is the institutionalization of digital and AI literacy programs that are tailored to the needs, language, and context of rural women. Such training must go beyond abstract instruction, offering hands-on learning experiences that directly demonstrate how AI can improve farming,

trading, and financial management. Regular refresher programs should also be introduced to ensure continuous adaptation as technologies evolve. By equipping women with knowledge and confidence, the risk of technology being viewed as intimidating or irrelevant is greatly reduced, and instead it becomes a practical tool for daily empowerment.

4. The government must design and enforce policies that deliberately mainstream gender considerations into AI development and deployment. Regulatory frameworks should require that AI systems used in agriculture, e-commerce, or finance are designed to recognize and counteract gender bias. This includes ensuring that rural women have representation in decision-making processes related to digital transformation policies. With inclusive governance structures, AI can be shaped to respond directly to the realities of rural women rather than imposing models that inadvertently marginalize them.
5. Finally, sustainable transformation will require strong partnerships between government agencies, private technology companies, non-governmental organizations, and community-based associations. No single stakeholder can single-handedly deliver the empowerment potential of AI. Partnerships should pool resources for capacity building, pilot innovative projects, and scale up successful interventions. Importantly, rural women's cooperatives and associations should be involved as active partners, ensuring that interventions are not imposed from above but co-created with the intended beneficiaries. Such participatory approaches are more likely to guarantee adoption, sustainability, and positive long-term outcomes.

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