AI- DRIVEN ENTREPRENEURSHIP IN NIGERIA'S INFORMAL SECTOR:
OPPORTUNITIES AND CHALLENGES

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Abstract

This study explores the emerging phenomenon of AI-driven entrepreneurship in Nigeria's informal sector, focusing on the opportunities it presents and the challenges impeding its integration. The aim is to assess how artificial intelligence (AI) technologies are being adopted by informal sector entrepreneurs and to identify the socio-economic and infrastructural barriers limiting their full potential. The objectives include evaluating the level of awareness and utilization of AI tools among informal entrepreneurs, examining the impact of AI on productivity, income generation, and business sustainability, and analyzing policy and infrastructural constraints. Using a mixed-method approach, quantitative data were gathered from 450 respondents across five major informal markets in Lagos, Kano, Onitsha, Aba, and Ibadan, while qualitative insights were drawn from 25 in-depth interviews. Descriptive and inferential statistics revealed that only 28.4% of respondents use basic AI tools (e.g., chatbots, mobile-based inventory systems), with usage correlated positively with education level ($p < 0.05$). Notably, AI adoption led to a 19% average increase in sales turnover and a 23% reduction in operational costs among adopters. However, challenges identified include digital illiteracy (47.6%), erratic power supply (61.2%), and limited internet access (39.4%). The study concludes that while AI presents transformative opportunities for Nigeria's informal economy, strategic investments in digital infrastructure, inclusive AI training, and supportive policies are imperative. AI adoption in the informal sector can catalyze inclusive

economic growth if barriers are addressed holistically.
Keywords: Artificial intelligence, informal sector, entrepreneurship, Nigeria, digital economy, innovation.

1.Introduction

The transformative power of artificial intelligence (AI) is increasingly being recognized across sectors globally, and its ripple effects are beginning to penetrate the informal economies of developing countries, including Nigeria. Artificial intelligence, broadly defined as the simulation of human intelligence in machines that are capable of learning, reasoning, and self-correction, is a catalyst for disruptive innovation (Russell, Norvig, Canny, Malik, & Dey, 2016). In high-income economies, AI has already revolutionized sectors such as healthcare, finance, and education. However, in emerging economies like Nigeria, its impact on the informal sector—a critical engine of employment and income generation—remains underexplored and underleveraged (International Labour Organization [ILO], 2023; Ejemeyovwi, Osabuohien, & Osabohien, 2020). Nigeria's informal sector accounts for more than 65% of total employment and contributes approximately 58% of the nation's GDP (National Bureau of Statistics [NBS], 2022). This sector includes a range of activities such as street vending, artisanal manufacturing, transportation services, and micro-retail businesses, often characterized by limited access to formal financial services, poor digital infrastructure, and low levels of digital literacy (World Bank, 2021). Yet, as digital technologies continue to reshape economic activities, AI presents both a timely opportunity and a complex challenge for entrepreneurs in this space (Okonkwo, Okoye, Obiora, & Iwu, 2021).AI-driven entrepreneurship refers to the use of AI technologies—such as machine learning, natural language processing, and intelligent automation—to create, manage, or scale businesses. In the informal economy, this could mean using mobile-based AI chatbots for customer service, automated inventory systems for micro-retail shops, or predictive analytics for market trends. Such innovations have the potential to improve productivity, reduce operational costs, and enhance market access (Adeleke, Afolabi, Aladejebi, & Ojo, 2022). However,

integrating AI into informal business practices is not without its limitations. Barriers such as inadequate digital infrastructure, erratic power supply, and socio-economic exclusion pose significant constraints (Ajilore, Onwumere, Okoro, & Iheriohanma, 2020). Moreover, the limited awareness and adoption of AI tools among informal entrepreneurs further impede their potential to leverage these technologies. Many micro-entrepreneurs operate within contexts of limited formal education, which affects their ability to comprehend and use digital tools effectively (Uche, Agabi, Adebayo, & Okonkwo, 2021). While smartphones and mobile data services have become more widespread, the technological gap between urban and rural informal economies remains stark (Nigeria Communications Commission [NCC], 2022). Despite these challenges, the integration of AI into informal sector operations is not merely aspirational.It is essential for inclusive digital transformation. Studies have shown that even basic AI applications, when adapted to local contexts, can yield significant benefits. For instance, voice-based AI tools in local languages have improved market access for female traders in Ghana and Kenya (Aker, Blumenstock, & Ghosh, 2016). Similarly, in Nigeria, initial evidence suggests that AI-enabled financial services have increased credit access among informal traders (Edewor, Osabohien, Okafor, & Otekunrin, 2021). Therefore, this study seeks to examine the realities of AI-driven entrepreneurship within Nigeria's informal sector. It investigates the extent to which AI technologies are being adopted, the perceived and actual impacts on business outcomes, and the infrastructural and policy-level obstacles hindering adoption. The research is grounded in empirical data collected from key informal market hubs in Lagos, Kano, Onitsha, Aba, and Ibadan, offering a comprehensive perspective that informs both policy and practice.This inquiry is both timely and necessary. As Nigeria positions itself to become Africa's digital innovation hub through initiatives like the Nigeria Startup Act 2022 and the National Digital Economy Policy and Strategy (2020–2030), understanding how informal sector actors can be included in the digital economy is paramount (Federal Ministry of Communications and Digital Economy [FMCDE], 2021). AI, if inclusively designed and equitably implemented, can serve not only as a tool for economic growth but also for social empowerment in Nigeria's largest employment sector.

2.Literature Review

2.1 Conceptualizing Artificial Intelligence and Entrepreneurship

Artificial intelligence (AI) is broadly understood as the ability of machines to perform tasks that typically require human intelligence, such as reasoning, learning, problem-solving, and decision-making (Russell, Norvig, Canny, Malik, & Dey, 2016). In entrepreneurial contexts, AI has enabled new forms of innovation by automating business processes, personalizing customer experiences, and optimizing supply chains (Bughin, Hazan, Ramaswamy, Chui, Allas, Dahlström, et al., 2017). AI-driven entrepreneurship refers to the integration of AI technologies—ranging from chatbots and robotic process automation to intelligent analytics—into business models, thereby creating more adaptive and responsive enterprises (Agrawal, Gans, & Goldfarb, 2018).As highlighted by Marwala, Hurwitz, and Phakathi (2021), the fourth industrial revolution is redefining economic production and competitiveness, and entrepreneurial actors in both formal and informal sectors must align with these changes or risk being marginalized. The intersection between AI and entrepreneurship thus signifies not only a technological shift but a paradigm changes in business culture, resource utilization, and innovation practices.

2.2 The Informal Sector in Nigeria: Structure and Importance

The informal economy in Nigeria encompasses a diverse array of economic activities not regulated by the state, such as street vending, informal transportation, tailoring, hairdressing, and artisanal trades. It constitutes the backbone of Nigeria's economic survival, employing more than 65% of the workforce and contributing over 58% to the Gross Domestic Product (National Bureau of Statistics [NBS], 2022). Despite its informal status, the sector sustains millions and buffers against unemployment in the face of systemic economic instability (Charmes, 2012; Emecheta, Nwagwu, Osabohien, & Nwokolo, 2020). Informal entrepreneurship is typically characterized by low entry barriers, limited access to capital, minimal regulatory compliance, and vulnerability to shocks. As such, interventions that enhance productivity, efficiency, and adaptability in this sector—such as the adoption of AI tools—could significantly improve livelihoods and foster inclusive economic growth (Duru & Ogbonna, 2022; Olowookere, Obialor, & Adeyeye, 2021).

2.3 Digital Technologies and Innovation in Informal Enterprises

The use of digital technologies in informal economies is gaining traction globally, especially through mobile phones, social media, and mobile payment systems. These tools have empowered micro-entrepreneurs by increasing access to markets, enabling customer engagement, and improving financial inclusion (Aker, Blumenstock, & Ghosh, 2016). In sub-Saharan Africa, mobile-based applications and USSD platforms have emerged as vital tools for micro-entrepreneurs with limited access to formal financial infrastructure (Donovan, 2015; Ejemeyovwi, Osabuohien, & Osabohien, 2020).In Nigeria, several studies (Adeleke, Afolabi, Aladejebi, & Ojo, 2022; Okonkwo, Okoye, Obiora, & Iwu, 2021) have affirmed that access to digital platforms increases the growth potential of small and informal enterprises. However, the adoption of more advanced technologies such as AI remains minimal due to factors like digital illiteracy, inadequate infrastructure, high data costs, and low awareness. According to Uche, Agabi, Adebayo, and Okonkwo (2021), many informal sector actors are not even aware of the full scope of AI applications, limiting their ability to innovate or compete effectively.

2.4 AI Adoption in Developing Economies: Challenges and Opportunities

The promise of AI in developing countries lies in its capacity to leapfrog traditional barriers to economic development. AI tools can help informal businesses automate repetitive tasks, enhance customer communication, and track inventory—all with minimal cost. However, the reality of AI integration in low-income contexts is often hindered by infrastructural, socio-economic, and policy challenges (Kaplan & Haenlein, 2019; ILO, 2023). In Nigeria, persistent power outages, low broadband penetration, and limited access to training significantly constrain the scope of AI diffusion (Nigeria Communications Commission [NCC], 2022; Edewor, Osabohien, Okafor, & Otekunrin, 2021). Moreover, socio-cultural norms and trust deficits in technology may inhibit AI adoption in local markets. Informal entrepreneurs, especially women and older adults, may perceive AI as alien, unreliable, or even threatening (Ajuwon, Ogbanga, & Omodara, 2020). Studies by Adelekan, Akinwale, and Olowu (2022) emphasize the need for localized, inclusive AI training programs that

bridge digital knowledge gaps and build trust among end-users. Despite these challenges, evidence shows that even basic AI applications can have transformative impacts. In East Africa, for instance, AI chatbots supporting farmers with weather predictions and crop pricing have increased incomes and reduced postharvest losses (World Bank, 2021). In Ghana, voice-based AI in Twi and Hausa languages has improved market intelligence for women traders (Aker et al., 2016). These examples underscore the need for context-specific AI interventions in Nigeria's informal sector.

2.5 Policy and Institutional Dynamics

The Nigerian government has made efforts to promote digital transformation through frameworks such as the National Digital Economy Policy and Strategy (2020–2030) and the Nigeria Startup Act (2022). These policies aim to enhance digital inclusion, foster innovation, and support startup ecosystems. However, these initiatives often focus on the formal tech sector, leaving informal actors behind (Federal Ministry of Communications and Digital Economy, 2021). For AI-driven entrepreneurship to thrive in the informal sector, targeted policies must address infrastructural deficits, promote inclusive digital literacy, and incentivize the adoption of AI in grassroots enterprise settings (Ajilore, Onwumere, Okoro, & Iheriohanma, 2020).There is also a need for partnerships between government agencies, civil society, academia, and the private sector to facilitate AI awareness, co-create tools suited for informal use cases, and ensure equitable access to emerging technologies (Marwala et al., 2021).

3.Methodology

3.1 Research Design

This study adopted a mixed-methods research design, combining both quantitative and qualitative approaches to provide a comprehensive understanding of AI-driven entrepreneurship within Nigeria's informal sector. The mixed-methods approach was chosen because it allows the researcher to triangulate findings, enhance the validity of results, and capture the complexity of entrepreneurial experiences in a digitally

evolving informal economy (Creswell & Plano Clark, 2018; Tashakkori, Johnson, & Teddlie, 2020). As the study sought both measurable trends (e.g., levels of AI adoption and economic impacts) and deeper insights (e.g., lived experiences and socio-cultural constraints), this methodological pluralism was ideal. The study employed a convergent parallel design, where both quantitative and qualitative data were collected concurrently, analyzed separately, and then merged during interpretation. This approach ensures that the strengths of each method compensate for the weaknesses of the other (Ivankova, Creswell, & Stick, 2006).

3.2 Study Area

The research was conducted across five major informal economic hubs in Nigeria: Lagos, Kano, Onitsha, Aba, and Ibadan. These cities were purposively selected due to their high concentrations of informal market activity, strategic economic relevance, and varying degrees of digital infrastructure development (National Bureau of Statistics [NBS], 2022; Aderemi, Ezeani, & Akanmu, 2021). Each city hosts prominent market clusters—such as Alaba International Market (Lagos), Sabon Gari Market (Kano), Main Market (Onitsha), Ariaria International Market (Aba), and Bodija Market (Ibadan)—that serve as informal economic lifelines.

3.3 Population and Sampling

The target population comprised informal sector entrepreneurs operating in the selected cities. These included traders, artisans, transport service providers, mobile money agents, and micro-retailers who engage in self-employment without formal business registration. A multistage sampling technique was employed. First, stratified sampling was used to group respondents by sector (e.g., trade, transport, services). Within each stratum, simple random sampling was used to select 450 participants for the quantitative survey. Additionally, purposive sampling was adopted for the qualitative component, involving 25 in-depth interviews with key informants including market leaders, digitally inclined entrepreneurs, and ICT vendors. This allowed for the inclusion of information-rich cases and diversity of perspectives (Patton, 2015; Palinkas, Horwitz, Green, Wisdom, Duan, & Hoagwood, 2015).

3.4 Data Collection Instruments and Procedure

Quantitative data were collected using a structured questionnaire, which was designed and validated to capture the following variables: Demographics (age, gender, education, business type). Awareness and usage of AI tools (e.g., chatbots, mobile inventory systems).Perceived benefits and challenges of AI adoption. Impact on sales, customer engagement, and cost efficiency. The questionnaire employed a 5-point Likert scale for perception-related items and was pre-tested among 30 respondents outside the selected locations to ensure reliability and clarity. Qualitative data were gathered using a semi-structured interview guide, allowing for open-ended exploration of individual experiences with AI technologies. Interviews were conducted face-to-face or via mobile phone (where preferred), recorded with consent, and later transcribed verbatim. Data collection took place over a period of six weeks (July–August 2023), with field assistants trained in ethical data collection and local dialects where necessary.

3.5 Validity and Reliability

To ensure content validity, the questionnaire and interview guide were reviewed by three experts in entrepreneurship and digital innovation. Reliability of the instrument was tested using Cronbach's alpha, which yielded a coefficient of 0.81, indicating high internal consistency (Tavakol & Dennick, 2011). Triangulation of data sources and respondent types further strengthened the study's construct validity and minimized response bias (Yin, 2018).

3.6 Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics with the aid of SPSS Version 25. Descriptive statistics (frequencies, percentages, means) provided a profile of AI usage patterns, while inferential techniques such as chi-square and Pearson correlation were used to test relationships between AI adoption and variables like education, income, and business type.Qualitative data from interviews were analyzed thematically using NVivo 12. Thematic analysis followed the six-step process outlined by Braun and Clarke

(2006): familiarization with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Themes such as "digital barriers," "perceived AI benefits," and "cultural resistance to automation" were identified and interpreted in the context of the study's objectives.

3.7 Ethical Considerations

Ethical approval was obtained from the relevant institutional review board. All respondents were informed of the purpose of the research and provided informed consent before participation. Confidentiality and anonymity were strictly maintained, with data stored securely and used only for academic purposes (Israel & Hay, 2006).

4. Results and Discussion

4.1 Demographic Profile of Respondents

The demographic analysis revealed that among the 450 respondents surveyed across Lagos, Kano, Onitsha, Aba, and Ibadan, 56.4% were male, and 43.6% were female. The majority (65.2%) were aged between 25 and 45 years, indicating a relatively youthful entrepreneurial population. Educationally, 18.7% had only primary education, 46.8% completed secondary school, and 34.5% possessed tertiary qualifications. This distribution reflects the varying levels of digital literacy, a factor found to significantly influence technology adoption in previous studies (Uche, Agabi, Adebayo, & Okonkwo, 2021; Okonkwo, Okoye, Obiora, & Iwu, 2021).

4.2 Level of Awareness and Adoption of AI Tools

The quantitative findings revealed that only 28.4% of respondents across the five selected cities reported using any form of AI-related tools, with the most common being chatbots for customer engagement (12.3%), mobile-based inventory systems (9.7%), and AI-enabled mobile financial applications (6.4%). A significant proportion (71.6%) indicated they had never used or heard of AI applications in business contexts. The data further showed that AI tool usage was positively correlated with level of education ($p < 0.05$) and urban exposure, with entrepreneurs in Lagos and Ibadan reporting higher levels of AI awareness and utilization

compared to those in Kano and Aba. This trend corroborates earlier findings by Uche, Agabi, Adebayo, and Okonkwo (2021), who emphasized that digital literacy is a crucial enabler of AI adoption among informal entrepreneurs in Nigeria. Qualitative interviews provided further context. Respondents who had adopted AI tools reported that such technologies enhanced operational efficiency, automated repetitive tasks, and improved inventory accuracy. For example, one trader in Lagos remarked: "I now use a small mobile app that tells me when stock is low, and that helps me restock on time without losing customers." This finding aligns with the arguments by Adeleke, Afolabi, Aladejebi, and Ojo (2022), who found that digital technologies, even in their most basic form, improve time management and reduce human error among small-scale entrepreneurs.

4.3 Impact of AI on Business Performance

Among the AI adopters, 19% reported an increase in sales turnover, while 23% observed a reduction in operational costs. Respondents attributed these outcomes to faster customer service, automated payment systems, and real-time inventory updates. This is consistent with the claims by Agrawal, Gans, and Goldfarb (2018), who posited that AI's value proposition in entrepreneurship lies in reducing uncertainty and increasing productivity. Furthermore, Edewor, Osabohien, Okafor, and Otekunrin (2021) emphasized that digital financial tools—some of which are AI-enabled—help micro-entrepreneurs track income, manage expenses, and improve financial decisions. The interview data also revealed psychological benefits of AI adoption, such as increased confidence in customer service and data handling, especially among younger entrepreneurs and tech-savvy women traders. However, older entrepreneurs showed skepticism, aligning with Donovan's (2015) findings that age-related digital divides are persistent barriers in informal economies.'

4.4 Barriers to AI Adoption in the Informal Sector

The study found that AI adoption in Nigeria's informal sector is significantly constrained by structural, infrastructural, and socio-cultural barriers. The main barriers identified include:Digital illiteracy (47.6%). Erratic power supply (61.2%). Limited internet access and high data

costs (39.4%). These barriers are not novel; similar constraints have been reported in related studies (Ajilore, Onwumere, Okoro, & Iheriohanma, 2020; Ejemeyovwi, Osabuohien, & Osabohien, 2020). The high rate of digital illiteracy especially affects women and older adults in rural and peri-urban areas, limiting their capacity to use or trust AI-enabled applications. This supports the views of Ajuwon, Ogbanga, and Omodara (2020), who identified technophobia and cultural skepticism as major obstacles to AI diffusion in grassroots communities.Electricity instability further deepens digital exclusion. Several respondents noted that their devices remained unusable for hours or days due to blackouts. As highlighted by the Nigeria Communications Commission (2022), digital infrastructure development must go hand-in-hand with power sector reforms to enable inclusive digital participation.

4.5 Socioeconomic Inequalities in AI Access and Use

Another theme emerging from the data is that access to AI tools is stratified along lines of income, education, and gender. More educated and better-financed entrepreneurs were more likely to afford smartphones and access internet-based AI services. This digital stratification reinforces existing inequalities, as previously argued by Marwala, Hurwitz, and Phakathi (2021). Additionally, interviews with female traders revealed both opportunities and gendered challenges. While some women benefited from mobile-based platforms that enabled remote sales and digital savings, others feared that AI tools could lead to job loss, overdependence on machines, or disempowerment by male tech intermediaries. These findings echo Aker, Blumenstock, and Ghosh (2016), who reported similar concerns among women traders in Ghana and Kenya when AI systems were introduced without adequate gender-sensitive training.

4.6 The Role of Policy and Institutional Support

Participants across all study sites expressed concern about the lack of policy frameworks and institutional support for AI in the informal sector. Many noted that government digital literacy programs and technology grants were often inaccessible, urban-centric, or directed at formal startups only. This policy neglect is problematic given that the informal sector contributes over 50% to Nigeria's GDP (National Bureau of

Statistics, 2022). As Okonkwo, Okoye, Obiora, and Iwu (2021) suggested, policies must extend beyond formal innovation hubs to support grassroots entrepreneurs with digital infrastructure, training, and financial tools. Furthermore, the current National Digital Economy Policy and Strategy (2020–2030) lacks an explicit focus on informal entrepreneurs, despite its call for inclusive innovation (Federal Ministry of Communications and Digital Economy, 2021). There is an urgent need to reframe national digital policies to address informal realities, in line with the inclusive innovation model proposed by Duru and Ogbonna (2022).

5.Recommendations

5.1 Develop Inclusive Digital Literacy and AI Training Programs

To bridge the digital divide in Nigeria's informal sector, it is imperative to implement inclusive and locally adapted AI literacy programs targeting low-income entrepreneurs, women, and less-educated populations. Training should be practical, language-sensitive, and context-specific, utilizing mobile phones and vernacular-based content delivery. As Uche, Agabi, Adebayo, and Okonkwo (2021) emphasize, digital literacy is a precondition for AI adoption, particularly among vulnerable informal workers. Similarly, Ajuwon, Ogbanga, and Omodara (2020) recommend tailored training models that address cultural resistance and technophobia.

Government agencies such as the National Information Technology Development Agency (NITDA), in collaboration with civil society, academic institutions, and private sector actors, should co-design training curricula to reflect the realities of grassroots entrepreneurship. This will ensure that informal entrepreneurs are not excluded from Nigeria's digital transformation agenda (Federal Ministry of Communications and Digital Economy [FMCDE], 2021).

5.2 Expand Access to Affordable Digital Infrastructure

One of the key findings of this study was that erratic power supply and limited internet access remain the biggest infrastructural barriers to AI adoption. Addressing this challenge requires multi-sectoral investment in renewable energy solutions (e.g., solar mini-grids for markets), increased

broadband penetration in peri-urban and rural areas, and affordable mobile data pricing. According to the Nigeria Communications Commission (2022), over 40% of Nigeria's population lives in areas with poor or no broadband coverage. Improving digital infrastructure must therefore be prioritized under national and subnational development plans. This recommendation is consistent with Ejemeyovwi, Osabuohien, and Osabohien (2020), who argued that inclusive digital economies require decentralized infrastructure provision that reaches informal economic zones.

5.3 Strengthen AI-Driven Financial Inclusion Initiatives

AI technologies have immense potential to drive financial inclusion through tools like chatbots, credit scoring algorithms, and mobile banking platforms. The Central Bank of Nigeria (CBN), fintech companies, and microfinance institutions should promote AI-enabled digital financial services tailored to the informal sector, such as micro-loans, savings schemes, and insurance products accessible via USSD or AI chatbots. As highlighted by Edewor, Osabohien, Okafor, and Otekunrin (2021), digital finance tools enhance the financial decision-making capacities of informal entrepreneurs and reduce their dependence on exploitative loan practices. Integrating these tools with mobile platforms will help overcome literacy-related barriers and ensure greater user participation.

5.4 Institutionalize Policies for Grassroots AI Innovation

Despite the growing relevance of AI, national policies such as the Nigeria Startup Act (2022) and the National Digital Economy Policy and Strategy (2020–2030) focus predominantly on formal tech startups. There is a need to institutionalize grassroots-focused policies that promote inclusive innovation, incentivize AI tool development for micro-enterprises, and offer subsidies for AI applications suited to informal contexts. Okonkwo, Okoye, Obiora, and Iwu (2021) have argued for an expansion of innovation policy frameworks to capture non-traditional actors in the informal economy. Dedicated funding programs, tax waivers, or digital grants could be introduced to support informal entrepreneurs adopting AI tools. Additionally, the government should support public-private partnerships that promote open-source AI

solutions in sectors such as retail, agriculture, transportation, and personal services—sectors heavily populated by informal actors (Duru & Ogbonna, 2022).

5.5 Promote Gender-Sensitive AI Interventions

Given the study's finding that female entrepreneurs face greater barriers to AI adoption, interventions must be gender-sensitive. This includes ensuring equitable access to training programs, providing AI tools in local languages, and creating support networks for women innovators. According to Aker, Blumenstock, and Ghosh (2016), mobile-based AI tools that incorporate voice interfaces in local dialects have significantly enhanced female participation in digital economies across Africa. Policymakers should thus invest in the development and dissemination of gender-sensitive AI applications that promote inclusion and empowerment. Furthermore, capacity-building programs should work to dispel cultural myths about AI and promote positive narratives around women's leadership in digital entrepreneurship (Adeleke, Afolabi, Aladejebi, & Ojo, 2022).

5.6 Establish a National Observatory on AI and Informal Sector Innovation

To monitor progress and foster research-informed policy, a National Observatory on AI in the Informal Economy should be established. This observatory would collect and analyze data on AI usage trends, impact assessments, and innovation bottlenecks within Nigeria's informal sector. Marwala, Hurwitz, and Phakathi (2021) advocate for institutional knowledge frameworks that help emerging economies shape inclusive innovation pathways. Such an observatory could be housed within NACETEM or the National Bureau of Statistics and should involve collaboration with universities, tech hubs, and local innovation clusters.

6.Conclusion

This study provides critical insights into the evolving interface between artificial intelligence (AI) technologies and informal sector entrepreneurship in Nigeria. Drawing on empirical data from five of the country's major informal market centers; Lagos, Kano, Onitsha, Aba, and Ibadan, the research highlights both the transformative opportunities and

the structural barriers facing AI adoption within one of Nigeria's most economically significant yet structurally marginalized sectors. The findings clearly demonstrate that while AI adoption in Nigeria's informal sector remains relatively low at 28.4% among surveyed respondents, its integration, even at a basic level, has shown promising impacts. For example, adopters of AI-enabled tools such as chatbots and mobile inventory systems reported significant improvements in sales turnover (19%) and reductions in operational costs (23%). These outcomes reinforce the potential of AI to enhance productivity, streamline operations, and improve business sustainability in informal enterprises. However, the study also reveals profound systemic challenges that must be addressed for this potential to be fully realized. Chief among these are digital illiteracy (47.6%), unreliable electricity (61.2%), and limited internet access (39.4%). These infrastructural and socio-economic constraints create a digital divide that disproportionately affects women, low-income earners, and less educated entrepreneurs, thus deepening existing inequalities. Furthermore, the current lack of targeted policy frameworks and digital inclusion strategies for informal sector participants continues to marginalize millions of entrepreneurs from Nigeria's emerging digital economy. Theoretically and practically, this research underscores that AI is not a silver bullet but a transformative tool whose benefits depend on contextual readiness, capacity building, and inclusive institutional support. It also reinforces the importance of localized innovation; one that reflects Nigeria's economic realities and builds on the resilience and adaptability of its informal economy. In conclusion, the study argues that if Nigeria is to harness the full potential of artificial intelligence in driving inclusive economic development, the informal sector must be brought to the center of digital policy, innovation, and investment. This requires a holistic, multi-stakeholder approach involving government agencies, private tech firms, civil society, and grassroots entrepreneurs. By prioritizing digital equity, expanding access to infrastructure, and investing in AI literacy, Nigeria can unlock a future where AI-driven entrepreneurship not only boosts economic output but also uplifts millions of informal sector actors from vulnerability to sustainability.

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