



## Artificial Intelligence in Nigeria: A Catalyst for Economic Growth, Innovation, and Technological Advancement

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### Abstract

Artificial Intelligence (AI) can transform several sectors in Nigeria, with a swiftly rising population and a flourishing digital economy. With 164 million Internet users and 219 million mobile phone subscribers as at the first quarter of the year 2024, Nigeria presents a fertile ground for AI-driven innovations across various sectors and addresses key challenges, including food security, health care, education, financial inclusion, and infrastructure development. This study investigates Nigeria's current state of AI adoption, the potential and application of AI across various sectors, and the challenges hindering the adoption of AI in Nigeria. It also looked at the roles of government programs, research institutes and private organizations in promoting AI innovation. However, despite these, some challenges are clearly evident, such as limited infrastructure, a shortage of skilled professionals and a lack of set rules and regulations. Nigeria has significant potential to harness AI for economic growth and development. The paper highlighted the need for strategic investing in AI infrastructure, AI research funding, education and developing policies that ensure ethical and responsible AI deployment. With proper implementation, AI has the potential to drive economic growth, improve public services, and enhance overall societal development, positioning Nigeria as a leader in AI-driven innovation in Africa.

**Keywords:** Artificial intelligence, Economic growth, Innovation, Nigeria

### Introduction

Nigeria, with over 200 million people, is the most populous nation in Africa and ranks seventh in the world in terms of population (Nigeria Multidimensional Poverty Index, 2022). Nigeria's population is expected to hit 210 million by 2050, making it the third most populous country in the world (United Nations Department of Economic and Social Affairs, UNDESA, 2015). Nigeria, the largest economy in Africa by nominal GDP, estimated its nominal GDP at 362.81 dollars in 2023 (World Bank, 2023). Lately, Nigeria has experienced substantial growth in technology usage, with 164 million active Internet users and 219 million mobile phone users as of Q1 2024 (Nigeria Bureau of Statistics {NBS}, 2024). These figures imply a healthy adoption of the Internet and mobile phones to deliver digital services and possibly AI-enabled applications.

Nigeria is a lower-middle-income country with fairly high levels of social inequality. 40 percent of the total population are living below the country's poverty line of 137,430 naira (\$381.75) per year (NBS, 2024). However, this is where AI comes in as a way of solving these challenges faced in the various sectors of the country. For example, the use of AI in precision farming is a sure way to increase food security and improve yields (Adepoju, 2022). In healthcare, solutions such as Explainable AI (XAI) would be useful for increasing the optimization of maternal and newborn health (Hanauer, 2024). Furthermore, AI can create new employment, spur investment, and renew the nation's economy, thus enhancing sustainability.

In Nigeria, the government has acknowledged the capability of AI and has sought to develop programs such as the National AI Strategy 2020-2030 as well as the National Centre for Artificial Intelligence and Robotics (NCAIR) (Omogbai, 2024). The government also set up the National Information Technology Development Agency (NITDA) for the promotion of the digital economy. Also, some state governments, like Edo and Lagos, are executing policies

and projects that seek to encourage ICT development and a guaranteed business environment (International Trade Administration, 2023). All these are clear indicators that the Nigerian government is making serious efforts in the use of technology and innovation to shape the economy and the lives of its citizens.

Nigeria's research and innovation ecosystem is growing, with several universities establishing AI research centers. According to a report by EduRank (2024), the University of Ibadan, the University of Nigeria, and Covenant University are among the leading institutions conducting cutting-edge AI research. For instance, Covenant University signed a deal with OBTranslate to conduct research and development in a wide and diversified field including; artificial intelligence (Covenant University & OpenBinacle Group, 2023). Also, the usage of AI is emerging in the private sector, and many companies have adapted to it. Most solutions currently target the financial services, agriculture, and healthcare sectors (Okonkwo & Ade-Ibijola, 2021).

Nevertheless, Nigeria still faces structural challenges like unreliable electricity and limited internet connectivity in many parts of the country; these keep technology adoption and innovation low (Oghuvbu et al., 2022; Ekeinde et al., 2022). Poor government funding continues to make research funding inadequate in Nigeria compared to developed countries (Echono, 2023). Other challenges include restricted data access, a scarcity of AI professionals, and the absence of clear policies guiding responsible AI use and advancement. Nevertheless, Nigeria's large population, fast-growing IT sector, and natural resources that have not been fully tapped presented a massive opportunity for development and the expansion of AI technologies.

### Statement of the Problem

Nigeria faces multiple obstacles that prevent it from exploiting AI innovations for economic development and technical innovation, despite its rapid digital expansion and growing AI implementation. AI-driven progress is slow because Nigeria lack sufficient AI infrastructure, possess limited skilled professionals and inadequate funding for AI research. Furthermore, unstable power supply, inadequate Internet accessibility, and regulatory uncertainties hinder the proper deployment of AI across the nation. The government's AI promotion policies encounter challenges due to absence of a comprehensive regulatory framework for ethical handling of AI, the safeguarding personal data, and the prevention of workforce reduction through automation. The deployment of AI technology mostly occurs in limited sectors, which results in insufficient development of other industries. Not addressing the current challenges will cause Nigeria to fall behind other nations in adopting AI technologies. This will also Nigeria from taking the opportunities to improve its economic, public service and marketing. This research evaluates AI deployment in Nigeria to identify existing hurdles in the path to national development and proposes specific solutions to facilitate AI potential as drivers of innovation and national progress.

### Objectives of the Study

The specific objectives are:

- To examine the current state of AI adoption in Nigeria
- To examine the potential and applications of AI across various sectors
- To analyze the challenges hindering AI adoption in Nigeria

### Research Questions

The following questions guided the study:

- What is the current state of AI adoption in Nigeria?
- What are the potential and applications of AI across various sectors?
- What are the challenges hindering AI adoption in Nigeria?

### Current State of AI Adoption in Nigeria

Currently, Nigeria's interest in AI has risen gradually; many organizations and startups have applied AI in different fields. Anijekwu and Ajayi (2024) noted that 29% of Nigerian fintechs currently use generative AI for content creation. Many fintech startups are also leveraging AI to deliver banking services like microcredit, mobile money, digital payment, and money transfers, extending financial services to the marginalized, deepening financial inclusion, and increasing economic opportunities (Dahlia, 2024).

In the manufacturing sector, the adoption of AI methods by the Nigerian Bottling Company, Port Harcourt, has had a positive impact on staff performance in terms of improved efficiency and effectiveness of service delivery (Akpan,

2015). AI has also been used in agriculture to provide operational advisories and weather information, improve fertilizer usage, soil and crop health and provide recommendations for the proper use of farm data for improving crop yield (Vota, 2024). The healthcare field also applies AI to early diagnosis of diseases, developing drugs, and remote healthcare services, which has enhanced access and quality of health care in society (STEMFocus, 2023). AI is also used to develop personalized learning, data analysis, virtual classrooms, and assessments (Ibrahim, 2023). The advent of AI tools has enabled virtual classrooms and online learning, which became increasingly important during the COVID-19 pandemic. Also, the use of AI analysis is informing the learning process with student performance analysis that assists teachers in decision-making.

AI adoption in Nigeria is increasing, but the International Monetary Fund (IMF) revealed that Nigeria lacks digital infrastructure for the deployment of AI technology (Akintaro, 2024). The main impediments to the use of AI in Nigeria are the shortage of AI researchers and data analysts; a scarcity of data; inadequate internet connectivity; and high implementation costs (Olaoluwa, 2024; Omogbai, 2024; Ogunbodede et al., 2020). Nevertheless, for Nigeria to harness the prospects of AI for the development of its economy, efforts will have to be made to enhance the development of talents for AI, infrastructure, legal frameworks, research grants and better synergism (Okpanum & Omeihe, 2024; Ekhator, 2024; Okonny, 2023). Coordinated initiatives will lead to utilizing AI to boost economic growth, increase the efficiency of public services, improve the standard of living, and reform the education system in Nigeria to develop the country into a digital economy.

### Potential and Applications of AI Across Various Sectors

Nigeria has substantial capability for the development and application of AI technologies. The country has a youthful, literate and technologically inclined population ratio, which is ideal for AI development and usage (Okpanum & Omeihe, 2024). Moreover, Nigeria has a strong tech infrastructure that comprises many startups and mid-market and large tech enterprises, which makes the country a catalyst for AI development. AI tools that can be used in the various sectors in Nigeria include:

- **Agriculture and Food Security:** Precision agriculture ensures that AI solutions used in farming considerably improve crop productivity, disease detection and assist the smallholder farmers. AI tools for agriculture and food security include:
  - i. **John Deere's Blue River Technology:** AI-driven precision agriculture and smart tractors.
  - ii. **Plantix:** AI-powered mobile app for crop disease detection.
  - iii. **Taranis:** AI for crop monitoring and pest detection using drones.
  - iv. **FarmLogs:** AI-powered farm management and predictive analytics.
  - v. **AgriBot:** AI-driven agricultural robotics for planting and harvesting (Fomsi, 2025).
  
- **Healthcare and Medical Diagnostics:** AI can be used in early diagnosis of diseases, developing drugs, and remote healthcare services, which can enhance access and quality of health care. AI tools for healthcare and medical diagnostics include:
  - i. **IBM Watson Health:** AI-powered medical diagnosis and treatment recommendations.
  - ii. **Google DeepMind (AlphaFold):** Predicts protein structures for drug discovery and research
  - iii. **PathAI:** AI-driven pathology diagnostics for detecting cancer.
  - iv. **Zebra Medical Vision:** AI-powered radiology analysis for identifying diseases.
  - v. **Babylon Health:** AI-driven telemedicine for patient consultations.
  - vi. **Medgic:** A mobile AI-powered diagnostic app that can analyze skin images to identify potential skin conditions.
  - vi. **Ada Health:** AI-powered Health Management App. A symptom checker that provides potential diagnoses based on user reported symptoms with 50 in-house medical experts (Fomsi, 2025).
  
- **Education:** AI is being used to develop personalized learning, data collection, data analysis, citation and referencing, PowerPoint presentation creation, virtual classrooms, and assessment/grading, virtual science labs, YouTube AI Channels, all of which improve learning outcome. AI tools for data collection include:
  - i. **SurveySparrow:** AI-powered survey tool with conversational surveys.
  - ii. **Qualtrics XM:** AI-enhanced platform for surveys, interviews, and real-time feedback.
  - iii. **KOBo Toolbox:** AI-supported data collection for field research.
  - vii. **Typeform:** AI-based tool for interactive and engaging data collection (Fomsi, 2025).

**AI tools for data analysis include:**

- i. **Julius:** AI-powered tool for data analysis
- ii. **Tableau:** AI-powered visualization and analysis of research data
- iii. **NVivo:** AI-enhanced qualitative data analysis software for coding and thematic analysis.
- iv. **JASP:** Open-source AI-driven statistical analysis software (Fomsi, 2025).

**AI tools for citation and referencing include:**

- i. **Zotero:** AI-assisted reference manager that organizes and formats citations.
- ii. **Mendeley:** AI-enhanced tool for reference management and paper annotation.
- iii. **JCiteThisForMe:** AI-powered automatic citation generator in multiple formats.
- iv. **EndNote:** AI-powered citation management with smart formatting features (Fomsi, 2025).

**AI tools for PowerPoint presentation creation include:**

- i. Gamma App, Canva, Adobe express
- ii. Tome, Page parade, Slidebean
- iii. Slide Lizard, Designs.ai, Pitch
- iv. Beautiful AI, Decktopus, Slides AI.io (Fomsi, 2025).

**AI tools for assessment/grading tools**

- i. Google Forms Formative (GoFormative)
- ii. ThatQuiz ZipGrade (App)
- iii. Microsoft Forms Kahoot
- iv. Quizizz Edmodo
- v. ClassMarker (Fomsi, 2025).

**AI tools for virtual classrooms**

- i. **Magicschool:** AI assistant for tailoring lesson plans and classroom resources automatically.
- ii. **Pear Deck:** AI-powered tool that enhances lesson delivery by integrating interactive elements such as polls, quizzes and student responses into presentations.
- iii. **Curipod:** AI-powered platform designed to help educators create interactive lesson activities and presentations

**Virtual Laboratory**

**Labster:** Labster provides virtual science labs where students can experiment in simulated environments. Ideal for schools lacking physical lab equipment (Fomsi, 2025).

**CK-12:** It is a platform that offers AI-powered tutoring for a range of subjects through its feature called "Flexi", providing explanations, answering questions, and adapting to individual learning needs.

**YouTube AI Channels:** Veritasium, Scishow, etc., provide channels of science and engineering videos explain complex topics visually (Fomsi, 2025).

• **Autonomous Vehicles and Transportation**

- i. **Tesla Autopilot:** AI-powered self-driving car technology.
- ii. **Waymo AI:** AI-driven autonomous vehicle navigation.
- iii. **NVIDIA Drive:** AI software for self-driving car simulations.
- iv. **Comma.ai:** Open-source AI for vehicle automation.
- v. **Uber AI:** AI for ride-sharing optimization and autonomous taxis (Fomsi, 2025).

• **Robotics and Automation**

- i. **Boston Dynamics AI (Spot, Atlas):** AI-driven humanoid and industrial robots.
- ii. **Rethink Robotics (Baxter, Sawyer):** AI-powered industrial automation robots.
- iii. **Miso Robotics (Flippy):** AI-driven kitchen automation and robotic chefs.

- iv. **SoftBank's Pepper AI:** AI-powered humanoid robot for customer service.
  - v. **ABB Robotics:** AI-driven manufacturing and warehouse automation (Fomsi, 2025).
- **Book Publishing**
    - i. **Content Creation:** ChatGPT, Deepseek, Gemini, Perplexity, POE
    - ii. **Editing and Proofreading:** Grammarly, ProWritingAid, Quillbot
    - iii. **Cover Design:** Canva, Adobe Sensei, and BookBrush
    - iv. **Audiobooks Production:** Google WaveNet, Amazon Polly, and Murf AI
    - v. **Book Translation:** Google Translate, DeepL, and Amazon Translate

For these to be realized, the government should be willing to invest in the building of a good AI structure. These will entail the provision of a solid and quality infrastructure, quality education, provision and research and development funding. The government will also have to put in place the right laws and regulations to lend support to AI innovations and their applications while at the same time addressing some key questions that relate to the privacy and security of the data that is required to build the AI solutions.

### Challenges and Solutions to AI Adoption in Nigeria

Some of the challenges that may include:

- Ethical concerns around the use of AI, such as bias and transparency (Okonny, 2023).
- Job displacement due to automation, may require retraining and upskilling of workers (Bunza, 2023).
- Lack of AI talent and infrastructure, could hinder the country's ability to develop and deploy AI technologies effectively (Okonny, 2023).
- Lack of a comprehensive regulatory framework

To overcome such issues, Nigeria will require a snapshot that includes the government, oil and gas firms, academic institutions, and civil society organizations. This will entail efforts to develop its AI talent pool through education, training, and research, as well as establish appropriate laws and guidelines on AI.

### Conclusion

Nigeria stands at a crucial juncture where artificial intelligence can serve as a transformative tool for economic and social progress. While AI adoption is growing in finance, healthcare, agriculture, and education, several obstacles, including inadequate infrastructure, limited AI expertise, and regulatory challenges, must be addressed. The government's commitment to AI through initiatives like the National AI Strategy and the National Centre for Artificial Intelligence and Robotics is a step in the right direction. However, for AI to reach its full potential, concerted efforts must be made to expand research funding, improve digital literacy, and develop ethical guidelines for AI deployment. Collaboration between the government, private sector, and academic institutions will be essential in ensuring that AI contributes to national development, job creation, and improved quality of life for Nigerians. By leveraging its youthful, tech-savvy population and growing digital ecosystem, Nigeria can position itself as a leader in AI innovation in Africa and beyond.

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