



THE IMPACT OF ARTIFICIAL INTELLIGENCE (AI) INNOVATIONS ON PUBLIC
SERVICE DELIVERY IN NIGERIA.

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Abstract

Artificial intelligence (AI) has become a transformative tool for public service delivery, providing remedies to persistent problems in public administration. This paper examines how AI is used in Nigerian public service delivery, highlighting both the advantages and disadvantages of its implementation. AI technologies, such as machine learning, predictive analytics, and automated decision-making systems, are revolutionizing government operations by boosting citizen satisfaction, efficiency, and transparency. In the developing nations like Nigeria, AI may be able to address persistent issues including uneven access to government services, delayed service delivery, and a lack of transparency. Yet the implementation of AI faces significant challenges such as inadequate infrastructure, a lack of digital literacy among public servants because they fear losing their jobs. This paper uses a qualitative methodology, relevant literature, textbooks, and a variety of pertinent data from earlier research on the use of AI in Nigerian public service delivery were examined. Results indicate that although AI holds great promise for revolutionizing public services, successful implementation will require an effective regulatory framework, ethics, and sufficient training programs for government workers. Nigeria will be able to fully utilize AI to achieve a more effective, transparent, and citizen-focused public service if these obstacles are overcome.

Keywords: Artificial Intelligence, Public Administration, Service Delivery, Infrastructure, Governance, Digital Divide

Introduction

The Nigerian government and various public institutions are gradually integrating AI systems to streamline processes, improve decision-making, and better serve the public. Artificial Intelligence (AI) has become a transformative force across various sectors, including healthcare, education, finance, and government. This technological advancement promises to drive economic growth, improve governance, and ensure more equitable access to services. However, there are some obstacles to the adoption of AI

in Nigerian public service delivery, including the digital divide, insufficient technological infrastructure, and concerns about data privacy and security (Ojo, 2020).

In industries like healthcare (e.g., AI-driven diagnostics), education (e.g., personalized learning platforms), and public safety (e.g., predictive policing and traffic management), artificial intelligence (AI) technologies like machine learning, natural language processing, and robotics are being investigated for applications. In spite of the fact that the potential advantages of AI are clear, Nigeria's ability to fully utilize these technologies is still a major concern (Ojo and Adetunji, 2021).

Nigeria's public sector has challenges related to inadequate infrastructure, a shortage of trained human resources, and ethical governance in the application of AI technology, despite the growing interest in AI on a worldwide scale. There is still a big disconnect between the theoretical advantages of these technologies and their practical application, even though certain Nigerian government agencies have started AI projects, such as using AI to control traffic in Lagos or to power health diagnostics in rural areas. The broad implementation of AI in public service delivery is hampered by the scarcity of internet access as well as insufficient capacity for data processing and storage (Akinbo and Ogunyemi, 2020). Additionally, there is a significant lack of AI literacy in the workforce, which hinders the government's capacity to efficiently develop, oversee, and implement AI systems. Additionally, ethical considerations such as data privacy, algorithmic prejudice, and the potential for employment displacement due to automation generate concerns among citizens and stakeholders.

In tackling these problems, it is essential to investigate how AI can be successfully incorporated into Nigeria's public sector while taking into account the ethical, social, and economic ramifications. Knowing how AI affects service delivery and the difficulties that come with it is essential for developing frameworks and policies that can help realize AI's full potential in revolutionizing Nigerian public services.

Objectives of the study

1. To examine the current state of AI's adoption in Nigeria's public sector.
2. To identify the key challenges hindering the full integration of AI in public service delivery in Nigeria
3. To evaluate the potential benefits and risks of AI innovations in improving public service delivery in Nigeria.

Conceptual Clarifications

Artificial Intelligence (AI):

According to Russel and Norvig (2020), AI is the term used to describe how technology, particularly computer systems, can simulate human intelligence processes. These procedures include self-correction, reasoning (using rules to arrive at approximate or definitive conclusions), and learning (acquiring knowledge and rules for applying it). Artificial Intelligence (AI) technologies are utilized in public service delivery to automate administrative processes, optimize decision-making, forecast trends, and provide citizens with individualized services. AI can be used, for example, in predictive healthcare diagnosis, traffic management systems, and the automation of applications for government services.

The ability of machines or computers to carry out tasks that normally require human intelligence is known as artificial intelligence. These tasks involve learning, reasoning, making decisions, and solving

problems. This wide definition includes several subfields, including machine learning and natural language processing, and refers to systems that mimic human cognitive processes ().

Mitchel (2017) stated that Artificial intelligence (AI) refers to machine learning (ML), a branch of AI that enables computers to learn from data and gradually enhance their performance without the need for explicit programming. Large datasets are used to train algorithms in machine learning (ML) so they can identify patterns, forecast outcomes, and make decisions based on fresh information. This AI paradigm places more emphasis on learning than on pre-programmed judgment.

According to Dastin (2020), AI is a subset of cognitive computing, which is the process of developing systems that simulate human thought patterns in order to tackle challenging issues. To comprehend and engage with the world, cognitive AI systems employ perception, reasoning, and problem-solving abilities. This definition of AI centers on building machines that can mimic human comprehension and judgment in practical settings, such financial forecasting or medical diagnosis.

Public Service Delivery

According to the United Nations Development Programme (UNDP) (2018), the term "public service delivery" describes how government agencies provide necessary services to citizens in order to satisfy their requirements. Healthcare, education, social welfare, security, housing, and transportation are a few examples of these services.

Akinyemi (2020) stated that in Nigeria, public service delivery refers to the government's responsibility to supply its people with basic utilities including power, water, healthcare, and education. These services are essential for tackling socioeconomic problems and enhancing life quality.

Public service delivery is also a reflection of how well government organizations administer public funds and provide services. Assuring timely service delivery, cutting down on bureaucratic obstacles, minimizing delays, and being answerable to the public are all part of this. (Ibrahim and Nwankwo, 2021).

The Current State of AI'S Adoption in Nigeria's Public Sector.

Although the use of artificial intelligence (AI) in Nigeria's public sector is still in its infancy, considerable efforts are being made to investigate how it might revolutionize government services, increase productivity, and solve a number of issues that public administration faces. Although artificial intelligence (AI) has begun to enter industries such as healthcare, transportation, governance, and education, widespread use is still constrained by technical, policy, and infrastructure issues. The key areas of AI adoption in Nigeria includes:

Healthcare: In Nigeria, one of the main fields where AI is being investigated is healthcare. AI-powered diagnostic instruments, such machine learning algorithms that help physicians diagnose illnesses, are starting to establish themselves in the field of public health. AI is also being utilized to optimize healthcare delivery, allocate resources, and do predictive analysis during disease outbreaks. Reducing the disparity in healthcare services between urban and rural areas is the goal of initiatives like AI-powered health diagnostic tools in rural areas (Ojo and Adetunji, 2021).

Road Transportation and Traffic Control: Cities like Lagos are also using AI in their traffic management systems. Artificial intelligence (AI)-driven automated traffic control systems and smart traffic signals help predict traffic patterns, ease congestion, and shorten travel times. To increase the

effectiveness of public transportation networks, the government has also investigated AI methods for managing and monitoring road conditions (Akinbo and Ogunyemi, 2020).

E-Government and Public Governance: Nigeria's public sector services and governance are gradually embracing AI. The Nigerian government has started creating digital platforms that allow residents to access a range of services. These include the e-passport system offered by the Nigerian Immigration Service, the digitization of government data using artificial intelligence, and policymaking that is enhanced by AI. Many of these applications are still discrete pilot projects rather than systematic integrations in spite of this (Nwachukwu and Adewuyi, 2021).

Learning and Education: Nigeria has also investigated the use of AI in education, including AI-powered virtual classrooms and personalized learning platforms. By tailoring learning experiences for each student, AI-based educational technologies, however still in their infancy, can increase access to high-quality education, particularly in impoverished and remote areas. This is especially helpful in remote areas where it can be difficult to find qualified teachers. For instance: AI is used by platforms like Khan Academy and Coursera to tailor instruction, offering insights that may be modified for Nigerian classrooms, particularly for self-paced learning (Aderemi and Afolabi, 2020).

The Key Challenges Hindering the Full Integration of AI in Public Service Delivery in Nigeria

Limited Technological Infrastructure:

AI systems that depend on cloud-based data processing and real-time communication require dependable internet connectivity, which is lacking for a sizable section of Nigeria's population, particularly in rural areas. To enable AI applications, many public institutions lack the necessary hardware infrastructure, including high-performance servers and data storage systems (Ibidun & Adebisi, 2022). Regular power outages and unstable electrical infrastructure make it difficult for AI tools to function well, as they need a steady supply of energy to function at their best.

Lack of Skilled Workforce

The integration of AI necessitates a highly skilled workforce, but Nigeria's education system currently lacks comprehensive programs for AI training (Adediran, 2023). Current public service employees are frequently not trained to work with AI, which leads to a reluctance to adopt AI technologies. Additionally, public sector institutions may not have the budget or resources to invest in continuous training for their staff.

Policy Regulatory Challenges

Nigeria does not have comprehensive and clear AI-related rules that specify best practices, ethical standards, and governance frameworks, despite some progress being made with the National Artificial Intelligence Policy. The integration of AI technology into public services is hampered by the absence of a national policy (Adebayo and Adebisi, 2021). There is still a lack of research on the ethical implications of AI in the public sector, such as algorithmic bias and responsibility for AI system judgments. Strong frameworks are required to handle the possible abuse of AI in the provision of public services.

Financial Constraints

Putting AI technologies into practice can be expensive. Many public service organizations may find the initial financial expenditure required for infrastructure, research, and human resources expensive for a developing nation such as Nigeria (Ammani, Bello and Isa, 2021). Government organizations may be

reluctant to devote significant resources to AI technology because of conflicting budgetary priorities, particularly if the return on investment is not immediately apparent.

Political and Institutional Resistance

Within public institutions, bureaucratic inertia and opposition to technological change are major obstacles. Some officials can be reluctant to embrace AI-driven reforms because they fear failure, lose control, or lose their jobs (Lata, Joseph and Prakash, 2022). Corrupt authorities who stand to lose from more effective systems may oppose AI systems, particularly those that offer efficiency and transparency. AI's potential to automate decision-making processes in ways that reveal wrongdoing may also raise issues.

Social and Cultural Barriers

Due to a lack of knowledge about the technology, Nigerians, like many others in underdeveloped nations, may be cautious about artificial intelligence. Public support for AI initiatives may decline due to concerns about technology taking over human occupations or making insensitive decisions (Adebanjo, Adeola, and Akinbo, 2022).

Legal and Ethical Challenges

Nigeria has begun to create certain legal frameworks, but they are still insufficient to handle the swift advances in AI. Comprehensive regulations are required to control the use of AI in a number of industries, including healthcare, transportation, and education (Ogunyemi & Alabi, 2022). If AI systems are not properly developed and evaluated, they may reinforce prejudices. If AI is not properly regulated, there is a fear that it would exacerbate already-existing societal inequities in a nation with a diverse population like Nigeria.

The Potential Benefits of AI Innovations in Improving Public Service Delivery in Nigeria.

Improved Automation and Efficiency Process Optimization: By automating repetitive processes, AI can speed up the processing of services like tax collecting, permit issuance, and application processing. For example, AI-powered chatbots can answer inquiries and address issues rapidly, lowering waiting times for citizens and enhancing service efficiency (Ammani et al., 2021). AI-powered solutions can help streamline intricate government procedures and cut down on the amount of time required to finish public service-related duties like healthcare registration, passport renewals, and licensing (Suleiman et al., 2021).

Improved Policy Development and Decision-Making: AI's capacity to evaluate enormous volumes of data enables more intelligent choices to be made about the formulation and application of policies. It can make governance more open and efficient by assisting in trend identification, result prediction, and evidence-based decision-making (Adebayo & Adebisi, 2021). Anticipating patterns like impending health emergencies, transportation jams, or shifts in the economy, AI might enhance public sector planning and enable prompt policy responses (Adebanjo et al., 2022).

Improved Healthcare Service Delivery: AI-driven advancements such as telemedicine, virtual health assistants, and diagnostic tools can deliver healthcare services to underprivileged regions of Nigeria where there is a shortage of medical professionals (Ammani et al., 2021). AI-powered diagnostic tools can improve healthcare delivery nationwide by assisting physicians in diagnosing illnesses more quickly and accurately. Health Monitoring: AI can be used to monitor public health data in real time, facilitating quicker responses to health emergencies such as disease outbreaks or epidemics (Ibidun & Adebisi, 2022).

Cost Savings and Resource Optimization: By spotting inefficiencies and enhancing resource allocation in sectors like infrastructure development, healthcare, and education, AI can maximize the use of public funds (Lata et al., 2022). Over time, AI can assist in lowering the administrative load and related expenses in a range of public services, resulting in long-term cost savings (Adediran, 2023).

Enhanced Accountability and Transparency: By lowering the amount of human judgment required to provide services, AI technologies can improve transparency in the delivery of public services. AI-based solutions, for example, can guarantee that procurement or tendering procedures are conducted in a fair and transparent manner (Adebanjo et al., 2022). By using AI to track and monitor government project development and notify officials of delays or poor management, the public sector can become more accountable (Suleiman et al., 2021).

Methodology

In order to investigate the difficulties and possibilities of incorporating artificial intelligence into the provision of public services in Nigeria, this study uses a qualitative research methodology. Secondary sources such as government publications, peer-reviewed journals, and reliable internet resources were used to collect the data.

Theoretical Framework

Technology Acceptance Model

The Technology Acceptance Theory (TAM), which was mainly created by Fred Davis in 1989, describes how people adopt and utilize new technologies. The theory is widely applied to comprehend the elements that impact technology adoption, particularly in public service and corporate contexts. According to TAM, two important factors influencing adoption are perceived utility and ease of usage. The use of TAM in the context of Nigeria's public service delivery can offer important insights on how citizens and government workers alike adopt technology developments like automated services, e-governance systems, and AI-driven platforms.

The Key Components of the Technology Acceptance Model

Perceived Usefulness (PU): The extent to which a person thinks that utilizing a specific system will improve their performance or simplify a task.

Perceived Ease of Use (PEOU): The extent to which a person thinks that utilizing a specific system would be effortless or trouble-free.

Behavioral Intention to Use (BIU): Perceived utility and simplicity of use have an impact on a person's intention to utilize a system.

Actual System Use: How much a person actually uses the technology depends on their behavioral purpose.

Application of TAM in Public Service Delivery in Nigeria

Digital Government Services and E-Government: Enhancing public service delivery in Nigeria requires e-governance efforts like digitalized land registration procedures, electronic payment systems, and online tax filing. Researchers and policymakers can evaluate citizens' perceptions of the utility and usability of these digital services by using TAM. For example, the National Identity Management Commission (NIMC) database and the Nigeria Immigration Service's e-passport application system

enable citizens to access services online, expediting the procedure and cutting down on time spent in lines. But in order for these technologies to be broadly adopted, people must believe that they are helpful (i.e., they improve the efficiency of the service process) and simple to use (i.e., the digital platforms should be easy to use and intuitive).

AI in Service Delivery: AI-powered chatbots for citizen questions and predictive analytics for public policy decision-making are two examples of the expanding trend of AI integration in the public sector. TAT can be used to assess the perceived utility and usability of AI-based systems in order to learn how the public and civil servants view them. Chatbots with AI capabilities, for instance, can be used to handle citizen complaints, respond to often asked queries, and assist individuals with bureaucratic procedures. However, the perceived usefulness (i.e., do they offer accurate, real-time information?) and usability (i.e., are they accessible to individuals with different levels of technology literacy?) of such technologies are critical to their effective acceptance in the public sector.

Delivery of Public Services via Mobile Devices: Mobile-based public service delivery systems are growing in significance in a nation like Nigeria, where mobile phone adoption is high. These are apps for smartphones that allow users to access government services including filing for licenses, paying taxes, and getting certifications. The degree to which citizens and government workers believe these systems are practical and easy to use will determine how well they work. For example, companies and individuals may accept a mobile app that streamlines tax payments if it is seen as both practical (i.e., it speeds up and simplifies the tax filing process) and user-friendly (i.e., it is easy to use and requires little effort to complete).

Empirical Review

Ammani et al. (2021) pointed out that telemedicine platforms and AI-powered diagnostic tools have been tested in different parts of Nigeria, enhancing access to healthcare, particularly in rural areas. Nigerian hospitals have implemented AI technologies such as DeepMind's eye disease detection system, which has greatly increased diagnostic accuracy and decreased the workload for medical staff.

The implementation of AI-based decision support systems in Nigerian hospitals has resulted in faster and more precise diagnoses, shorter wait times for patients, and higher patient satisfaction, as shown by Ibidun & Adebisi (2022). AI methods are also being used to help detect ailments like diabetes, heart issues, and tuberculosis early in impoverished areas where access to medical personnel is limited.

Adebayo & Adebisi (2021) explored the impact of AI in Nigerian public administration, particularly in automating government processes such as tax collection and citizen engagement. AI-driven chatbots have been implemented by several government agencies to streamline communication with citizens, answer inquiries, and reduce the administrative burden on public servants. For example, the Federal Inland Revenue Service (FIRS) has implemented AI systems to improve tax collection, resulting in higher revenue generation and better compliance with tax regulations.

Adebanjo et al. (2022) examined the use of AI in government procurement and tendering processes, noting that AI systems can reduce human bias and corruption in the procurement cycle. By automating the process and using AI to evaluate bids and tenders based on predefined criteria, Nigerian public institutions can ensure a more transparent and efficient system.

Suleiman et al. (2021) noted that AI-based e-learning platforms, such as Coursera and Khan Academy, have been utilized by Nigerian students to access quality education. These platforms use AI algorithms to recommend personalized learning paths for students based on their learning progress and preferences.

This has proven particularly beneficial in Nigeria's rural areas, where access to traditional educational resources is limited.

Adebayo & Adebisi (2021) also noted that administrative chores like exam scheduling and student registration are being automated by AI-driven systems in Nigerian universities, which has decreased wait times and increased operational efficiency.

One of Africa's most crowded cities, Lagos, was the subject of a study by Lata et al. (2022) on the application of AI to traffic control systems. Traffic flow has been optimized, congestion has been decreased, and public transportation efficiency has increased with the deployment of AI-powered traffic lights and monitoring systems. Better resource allocation and fewer traffic-related incidents are made possible by the Lagos State Traffic Management Authority's (LASTMA) use of artificial intelligence (AI) techniques to study traffic trends and forecast peak traffic hours.

AI can be utilized for infrastructure maintenance in Nigeria, according to Ogunyemi & Alabi (2022). These systems are made to anticipate when public infrastructure, such as roads and bridges, needs maintenance, preventing expensive malfunctions or accidents. Before they become major problems, structural flaws in roads and bridges can be identified by AI-powered sensors.

Conclusion

Nigerian public service delivery could undergo a transformation thanks to artificial intelligence, which could increase citizen participation, efficiency, and transparency. To fully reap the benefits of AI in public administration, a number of obstacles must be overcome. These include political opposition, a lack of proper infrastructure, and low levels of computer literacy among public employees. Nigeria may use AI technology to build a more effective and transparent public service system by making infrastructural investments, educating public employees, and creating legislative frameworks to guarantee the ethical use of AI.

Recommendations

Digital Infrastructure: The government must give top priority to making investments in a strong digital infrastructure in order to guarantee the effective integration of artificial intelligence (AI) in the provision of public services. This entails enhancing data processing and storage capacities as well as guaranteeing dependable internet connectivity, particularly in rural locations. AI systems will be supported by upgraded infrastructure to provide prompt and effective public services in all areas.

Boost Digital Literacy and Capacity Building: To raise public employees' proficiency with technology, training initiatives should be created and put into place. Developing digital literacy will enable public servants to use AI systems efficiently, which will lower opposition to technological advancements and improve service delivery as a whole. To keep employees abreast of emerging technology, workshops on AI and ongoing professional development should be provided.

Provide Ethical and Regulatory Frameworks: To ensure the moral application of AI in public services, the government should provide thorough rules and guidelines. These frameworks ought to cover issues with accountability, transparency, security, and data privacy. The government may increase public trust and guarantee that AI technologies are applied properly while providing public services by creating clear guidelines.

Pilot AI Projects in Important Sectors: The government should test the integration of AI in important sectors like public safety, healthcare, and education before implementing it widely. These pilot programs

will identify possible obstacles, evaluate how well AI technologies enhance service delivery, and offer insightful information for implementing AI across other government functions.

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