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ADVANCING TAXATION IN NIGERIA THROUGH ARTIFICIAL INTELLIGENCE: CHALLENGES AND FRAMEWORK FOR ADOPTION

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ABSTRACT

Artificial Intelligence (AI) presents transformative opportunities for improving tax administration globally and, in particular, provides avenues for Nigeria to strengthen revenue mobilization, enhance taxpayer compliance, reduce leakages, and modernize service delivery. Despite recent digitalization efforts—such as the introduction of TaxPro Max, automated VAT collection infrastructure, and recent tax reforms—Nigeria continues to struggle with a low tax-to-GDP ratio, weak compliance culture, administrative inefficiencies, and information asymmetry. This non-empirical paper synthesizes recent scholarly and policy literature on AI and taxation, identifies systemic challenges hindering AI adoption, and proposes a structured framework for responsible and sustainable AI integration in Nigeria's tax administration. Challenges highlighted include data fragmentation, legal and regulatory uncertainty, institutional capacity deficits, infrastructural weaknesses, algorithmic transparency issues, and cybersecurity risks. The study proposes a detailed framework covering strategic alignment, data governance, regulatory standards, institutional capacity building, ethical safeguards, infrastructure enhancement, and continuous evaluation. The paper contributes to the evolving discourse on modernization of Nigeria's tax system and provides policymakers, revenue agencies, and researchers with a practical model for structured adoption of AI.

Keywords: Taxation, Artificial Intelligent, Challenges, Adoption

INTRODUCTION

The effectiveness of tax administration plays a central role in determining the capacity of any nation to fund public expenditure and achieve socio-economic development. Nigeria, Africa's largest economy, continues to grapple with low revenue mobilization relative to its economic potential. With a tax-to-GDP ratio averaging between 6% and 10% in the past decade one of the lowest globally the need for a modernized and technology-driven tax system has become increasingly paramount. Traditional methods of tax administration face limitations in tracking informal sector activities, detecting fraud, maintaining comprehensive taxpayer records, and offering efficient taxpayer services.

Artificial Intelligence (AI) encompassing machine learning, natural language processing, intelligent automation, and data analytics has been increasingly applied by tax authorities around the world to improve accuracy, transparency, and efficiency in tax administration. African countries such as Rwanda and South Africa have made significant strides in this direction, demonstrating the relevance and feasibility of AI-enabled taxation in developing economies.

In Nigeria, several recent policy developments signal strong institutional interest in leveraging AI and digital systems. These include the expansion of e-filing platforms, automation of value-added tax (VAT) collection at source, increased integration of digital payment systems, and the enactment of the 2025 Tax Reform package. Recent academic studies and policy reports have also emphasized AI's potential to support predictive compliance, risk-based audit selection, intelligent taxpayer services, and fraud detection (NES Group, 2024; Nwuzor, 2025; Ogunkeye, 2024).

However, Nigeria's readiness for full AI adoption remains limited due to legal ambiguities, weak data governance structures, infrastructural constraints, institutional capacity challenges, and low digital literacy among taxpayers. To fully harness the benefits of AI, a structured framework is needed one that enables adoption while mitigating risks. This paper explores these issues in-depth and proposes a realistic and context-sensitive adoption framework.

Statement of the Problem

Nigeria's tax system suffers from persistent structural challenges undermining efficiency and revenue mobilization: **Low compliance and tax morale:** Many taxpayers lack trust in tax institutions, contributing to widespread evasion and under-reporting. Large **informal sector:** Over 60% of economic activities occur informally, making detection and assessment difficult. **Fragmented data systems:** Taxpayer data are scattered across multiple agencies with limited interoperability. **Inadequate administrative capacity:** Manual processing, limited analytical capabilities, and outdated operational procedures hinder performance. **Weak enforcement and audit selection:** Audits are often manually selected, leading to inefficiency and low yield .**Limited use of advanced technologies:** While digitalization is increasing, Nigeria still lags in adopting AI for predictive and analytical tasks. AI provides a pathway to addressing these issues, but its implementation faces serious challenges in Nigeria, including legal uncertainties, infrastructural limitations, ethical concerns, and capacity deficits.

Aim/Objectives of the Study

The overall aim of this study was to examine Artificial intelligent (AI) and Tax Advancement in Nigeria. Specifically the study seeks to achieve the following objectives:

1. Examine contemporary trends and evidence on the use of AI in tax administration globally and within Nigeria.
2. Identify key challenges limiting effective AI adoption in Nigeria's tax system.
3. Propose a comprehensive and context-specific framework for responsible AI integration in Nigeria's tax administration.
4. Make policy recommendations that ensure revenue optimization, legal compliance, and ethical governance of AI systems.

Review of Related Literature

Conceptual Review:

AI and Taxation: Global Perspective

Globally, AI has been integrated into tax administration in various forms including fraud detection systems, automated compliance verification, chatbots for taxpayer services, predictive revenue forecasting, and audit risk scoring. Countries such as the United States, Canada, the UK, and Singapore have implemented AI-driven models for audit selection, e-invoicing monitoring, and anomaly detection with notable improvements in efficiency and compliance outcomes.

AI-enabled tax systems often rely on large datasets, standardized information flows, and interoperable systems. These foundations enable machine learning algorithms to detect patterns and generate insights that improve tax enforcement and policy design.

Emerging Trends in AI-Driven Taxation in Nigeria

Recent Nigerian literature highlights growing interest in AI for strengthening tax systems. Nwuzor (2025) examines AI's role in enhancing compliance and reducing administrative inefficiencies. Ogunkeye (2024) highlights benefits of AI and robotic automation but cautions against legal and ethical risks. Policy reports such as NES Group (2024) emphasize AI's potential to increase transparency and reduce tax leakages. Additionally, the Federal Inland

Revenue Service (FIRS) has rolled out digital initiatives such as TaxPro Max, automated VAT collection, e-receipt systems, and data-driven compliance tools. These systems provide entry points for future AI integration.

Gaps in Existing Scholarship

While existing studies recognize AI's potential benefits, few provide a comprehensive framework tailored to Nigeria's unique socio-economic and institutional context. This paper filled that gap by proposing a structured adoption model focusing on data governance, legal frameworks, capacity building, and operational modernization.

Conceptual Discussion: AI Applications in Taxation:

Predictive Analytics for Compliance

AI models can analyze taxpayer behavior and identify high-risk entities for audit. Machine learning techniques can detect patterns associated with evasion, discrepancies, and fraudulent filings.

Intelligent Automation and Robotics

Robotic Process Automation (RPA) can automate routine tasks such as data entry, filing assessments, and taxpayer correspondence reducing administrative burden and error rates.

Natural Language Processing (NLP) for Taxpayer Services

NLP-based chatbots and virtual assistants help taxpayers navigate filing platforms, answer queries, and provide real-time guidance, thereby enhancing voluntary compliance.

E-Invoicing and Real-Time VAT Monitoring

AI systems can match e-invoices with financial reports to detect discrepancies in VAT declarations and prevent revenue leakages.

Predictive Revenue Forecasting

AI-enhanced forecasting integrates economic indicators, trade volumes, digital payment patterns, and sectoral trends for improved budget reliability.

Challenges Limiting AI Adoption in Nigeria:

Data Fragmentation and Quality Issues

Tax data in Nigeria exist across numerous systems banks, telecommunications companies, Customs, CAC, JAMB, NIMC, and private platforms. Lack of data standardization reduces AI model accuracy.

Legal and Regulatory Ambiguities

Key legal concerns include:

1. Absence of explicit rules governing automated tax decisions.
2. Unclear limits on data sharing across agencies.
3. Risk of violating privacy and data protection regulations.
4. Absence of AI liability and accountability guidelines.

Limited Institutional Capacity

AI adoption requires skilled staff in data science, machine learning, cybersecurity, and digital systems procurement skills currently scarce in most tax agencies.

Ethical Risks and Algorithmic Bias

AI models trained on biased data may unfairly target specific groups or sectors. Lack of explainability undermines taxpayer rights and trust.

Weak ICT Infrastructure

Effective AI deployment requires reliable internet, secure servers, cloud or hybrid compute systems, and constant power supply—areas where Nigeria still faces constraints.

Cybersecurity Vulnerabilities

Tax data are highly sensitive; breaches could cause massive financial and reputational damage. Robust cybersecurity governance is essential.

Proposed Framework for AI Adoption in Nigeria's Tax Administration

Phase I: Strategic Alignment and Use-Case Prioritization

1. Align AI initiatives with national tax policy and revenue strategies.
2. Identify high-impact, low-risk AI projects (e.g., anomaly detection, RPA for processing).
3. Establish clear success metrics and governance mechanisms.
4.

Phase II: Data Governance and Infrastructure Development

1. Create interoperable data standards across FIRS, Joint Tax Board, Customs, CAC, NIMC, and financial institutions.
2. Implement secure data warehouses with unified taxpayer identification.
3. Improve data quality through validation, cleansing, and metadata management.

Phase III: Regulatory and Ethical Frameworks

1. Develop AI-specific tax regulations covering transparency, accountability, and appeals mechanisms.
2. Introduce algorithmic impact assessments.
3. Protect taxpayers' rights through disclosure of automated decisions.

Phase IV: Capacity Building and Institutional Reform

1. Establish AI talent pipelines within tax authorities.
2. Partner with universities, tech vendors, and AI research labs.
3. Train staff on data analytics, cyber risk management, and AI operations.

Phase V: Infrastructure, Security, and Procurement Reform

1. Develop secure cloud or hybrid hosting platforms.
2. Strengthen cybersecurity protocols and continuous monitoring.
3. Adopt transparent procurement for AI solutions

Phase VI: Monitoring, Evaluation, and Continuous Improvement

1. Conduct periodic audits of models for fairness, accuracy, and compliance.
2. Implement taxpayer feedback systems.
3. Publish annual AI transparency reports to strengthen public trust.

RECOMMENDATIONS

1. Strengthen cross-agency data sharing frameworks with unified tax identification.
2. Accelerate legal reforms on automated decision-making in taxation.
3. Create an AI regulatory sandbox for controlled experimentation.
4. Invest in national data centers and cloud infrastructure to support AI systems.
5. Launch a national capacity building initiative on AI for tax administration.
6. Ensure ethical governance, including fairness audits and transparency requirements.
7. Promote public confidence through communication strategies and taxpayer education.

CONCLUSION

AI holds significant promise for enhancing tax administration in Nigeria by improving efficiency, compliance, and revenue generation. However, successful adoption requires strong

data governance, enabling laws, adequate capacity building, robust infrastructure, and responsible oversight. The framework proposed in this paper provides a structured pathway for Nigeria to modernize its tax system while managing the risks associated with AI. With sustained political will, institutional reforms, and investment, Nigeria can position itself as a leader in AI-driven public administration in Africa.

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