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ARTIFICIAL INTELLIGENCE AND E-GOVERNANCE TRANSFORMATION: AN ASSESSMENT OF INSTITUTIONAL PREPAREDNESS IN NIGERIAN MINISTRIES, DEPARTMENTS AND AGENCIES (MDAS)

ABSTRACT

The convergence of Artificial Intelligence (AI) and electronic governance (e-governance) has emerged as a defining paradigm in the organization of public administration globally. In Nigeria, the Federal Government has articulated ambitious aspirations to deploy AI and associated technologies across Ministries, Departments and Agencies (MDAs); yet systematic assessments of institutional preparedness remain scarce. This paper examines the readiness of Nigerian MDAs to adopt and integrate AI-driven e-governance frameworks, drawing on the Technology-Organization-Environment (TOE) framework as the primary theoretical lens. Through a critical synthesis of extant literature, policy documents, and official government reports, the paper identifies significant gaps in digital infrastructure, human capital, regulatory coherence, and organizational culture that constrain the effective integration of AI in Nigeria's public sector. The study maps prevailing policy initiatives including NITDA's Strategic Roadmap and Action Plan 2.0 (SRAP 2023–2027), the National Digital Economy and E-Governance Act 2024, and the Nigeria Data Protection Act 2023 against the requirements for genuine AI-readiness. The paper argues that institutional preparedness is not merely a technological problem but a governance challenge requiring coordinated reforms in leadership commitment, data governance, capacity development, and inter-agency collaboration. A conceptual framework—the MDA-AI Readiness Assessment Model (MARAM) is proposed, anchored on four interdependent pillars: technological infrastructure readiness, human capital and organizational readiness, regulatory and policy readiness, and governance and accountability readiness. The paper recommends that Nigerian MDAs adopt the MARAM framework as a diagnostic tool for phased AI integration, prioritizing investment in digital infrastructure and human capital while strengthening regulatory coherence across existing policy instruments. It further recommends that agency leadership institutionalize data governance structures and inter-agency collaboration mechanisms to sustain AI-readiness beyond initial adoption. Future empirical research should validate the MARAM framework across diverse MDA contexts.

Keywords: Artificial Intelligence, E-Governance, Institutional Preparedness, Nigeria's MDAs, Digital Transformation

1.0 Introduction

The global landscape of public administration is undergoing a profound transformation, driven by the accelerating adoption of Artificial Intelligence (AI) technologies across governmental systems. From automating routine administrative processes to enabling data-driven policymaking, AI has demonstrated transformative potential in enhancing the efficiency, transparency, and responsiveness of government institutions (Maragno et al., 2023). Electronic governance (e-governance) defined broadly as the application of information and communication technologies (ICTs) to improve government service delivery, citizen engagement, and internal administrative operations, provides the foundational architecture upon which AI applications in the public sector are increasingly being constructed (Abdulkareem, 2024).

In Africa, including Nigeria, governments are recognizing the imperative of digital transformation as a strategic policy priority. Nigeria's National Digital Economy Policy and Strategy, anchored on eight strategic pillars, articulates a comprehensive vision for a digitally enabled state, with e-governance and AI constituting central components of that vision (NITDA, 2023). The Federal Government of Nigeria has announced its intention to deploy AI, Machine Learning, Blockchain, and Robotic Process Automation (RPA) across MDAs to improve governance, streamline operations, and enhance service delivery (Bureau of Public Service Reforms [BPSR], 2025). NITDA's ongoing implementation of Digital Transformation Plans (DTPs) across MDAs, aligned with the Strategic Roadmap and Action Plan 2.0 (SRAP 2023–2027), represents the most visible institutional expression of this ambition. Yet, despite these policy commitments, the gap between articulated aspirations and actual institutional readiness remains considerable. Nigeria ranked 141st globally on the United Nations E-Government Development Index (EDGI) 2020, and evidence from successive reform cycles reveals persistent structural challenges, including inadequate digital infrastructure, limited digital literacy among civil servants, entrenched bureaucratic resistance, poor data governance, and systemic corruption that constrain the effective uptake of AI-enabled governance solutions (Adetunji et al., 2021; Abdulkareem, 2024; UNESCO, 2025).

Despite significant investments in e-governance infrastructure and the proliferation of policy frameworks for digital transformation, Nigerian MDAs continue to exhibit low levels of institutional preparedness for AI adoption. The Integrated Personnel and Payroll Information System (IPPIS), the Government Integrated Financial Management Information System (GIFMIS), and the Treasury Single Account (TSA) represent notable achievements in digitizing financial administration; however, these remain siloed initiatives that fall well short of the integrative, intelligence-driven systems envisaged under contemporary AI-governance frameworks (IFAC, 2023; BPSR, 2025). There is, therefore, an urgent need for a theoretically grounded assessment of what institutional preparedness entails in the Nigerian MDA context and what systemic factors enable or constrain it.

This conceptual paper is situated within this nexus of ambition and constraint. It seeks to systematically assess the institutional preparedness of Nigerian MDAs for AI-driven e-governance transformation by synthesizing relevant theoretical frameworks, empirical evidence from analogous

contexts, and current policy developments in Nigeria. The paper's central argument is that institutional preparedness transcends the mere acquisition of technology, it demands alignment across technological, organizational, and environmental dimensions, as theorized by the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990; Pulkkinen et al., 2025). The paper makes a threefold contribution to scholarship. First, it extends the application of the TOE framework to the specific context of AI-readiness in sub-Saharan African public institutions—a context that has received relatively limited theoretical attention (Mithi et al., 2024; Chilunjika & Chilunjika, 2024). Second, it situates the Nigerian MDA system within the broader African AI governance discourse, contributing to comparative perspectives on AI readiness in developing countries (ECDPM, 2024; Global Center for AI, 2025). Third, it provides a theoretically grounded conceptual framework that can guide future empirical research and inform institutional reform strategies in Nigeria and comparable governance environments.

This paper is structured as follows. Section two reviews relevant literature on AI and e-governance, the progress and persistent challenges of e-governance in Nigeria, and the regulatory and policy landscape governing AI adoption. Section three presents the theoretical framework, drawing on the Technology-Organization-Environment framework, Institutional Theory, and Dynamic Capability Theory. Section four outlines the methodology adopted for the study. Section five examines institutional preparedness in Nigerian MDAs, including the cross-cutting governance challenges shaping the MDA architecture. The paper concludes with policy implications and directions for future research.

2.0 Literature Review

2.1 Concept of AI and E-Governance

Artificial Intelligence, in its contemporary manifestations, encompasses machine learning, natural language processing, computer vision, and robotic process automation—technologies that collectively enable systems to perform tasks that have traditionally required human cognitive capacity (OECD, 2019). Within public administration, AI's utility lies in its capacity to automate repetitive tasks, enhance decision-making with real-time data, identify inefficiencies, and support predictive governance (Maragno et al., 2023). E-governance, as a conceptual domain, has evolved from its early formulation as the digitalization of government services to encompass a broader vision of technology-mediated transformation of state-citizen relations, inter-agency coordination, and public value creation (Abdulkareem, 2024; Moore, 1995).

The convergence of AI and e-governance has given rise to what scholars termed "intelligent governance" or "AI-augmented public administration" characterized by predictive service delivery, algorithmic decision support, and data-driven policy design (Yang & Wang, 2023). Globally, countries such as Estonia, South Korea, and the United Arab Emirates have pioneered AI-integrated governance ecosystems, demonstrating measurable improvements in administrative efficiency and citizen satisfaction (NITDA, 2023; BPSR, 2025). These cases, however, are grounded in mature digital infrastructure, high state capacity, and robust data governance regimes—conditions that differ markedly from the Nigerian context and which caution against uncritical technology transfer.

2.2 Progress and Persistent Challenges of E-Governance in Nigeria

Nigeria's e-governance journey, initiated in the early 2000s, has produced a complex mosaic of achievements and setbacks. The launch of the E-Government Master Plan in 2019 and the subsequent presidential directive to digitize 75% of government services by 2027 signal renewed political commitment to digital transformation (Open Government Partnership [OGP], 2024). NITDA's SRAP 1.0 (2021–2024) established over 683 digital infrastructure projects and implemented policies for mainstream digital adoption, while internet penetration reached approximately 55% by 2024, with an estimated 123 million internet users (OGP, 2024).

Nevertheless, systemic reviews of e-governance in Nigeria consistently highlight a cluster of recurrent challenges. Adetunji et al. (2021) identify limited power supply, inadequate infrastructure, the digital divide, corruption in public office, budgetary constraints, and insufficient technical expertise as the principal impediments. Abdulkareem (2024) further notes that Nigeria's substantial digital divides and deficient institutional trust hamper e-government participation. A systematic review by Madaki et al. (2024) underscores that IT integration in Nigeria's public sector remains fragmented, with inter-agency compatibility issues and weak change management frameworks further complicating implementation. Afieroho et al. (2023) similarly found that institutional trust deficits and limited citizen digital literacy significantly constrain e-government uptake, particularly at subnational levels. A Frontiers (2025) bibliometric analysis of ICT research in Nigeria's public administration confirms these persistent structural challenges, noting that promoting accountability and building citizen trust remain foundational prerequisites for sustainable digital governance.

In the anti-corruption domain, e-governance tools have yielded notable results. The TSA, IPPIS, and GIFMIS have collectively curbed financial leakages and improved transparency in government transactions, reportedly saving billions of naira in public funds (IFAC, 2023; BPSR, 2025). Yet these gains remain unevenly distributed across MDAs, and the transition to intelligent, AI-enhanced governance systems remains nascent.

2.3 Theoretical and Empirical Perspectives on AI Readiness in Developing Countries

The conceptualization of AI readiness is understood as the degree to which an organization or system possesses the requisite capabilities, structures, and conditions to successfully adopt and integrate AI—has attracted growing scholarly attention. Oxford Insights' Government AI Readiness Index (2023) evaluates countries along three dimensions: Government, Technology Sector, and Data and Infrastructure. Nigeria's performance on this index reflects limited digital infrastructure, nascent AI regulatory frameworks, and uneven governmental capability—consistent with broader findings for sub-Saharan Africa (Mithi et al., 2024).

Empirical work from analogous African contexts is instructive. In Ghana, a study drawing on the TOE framework, Institutional Theory, and e-Government readiness models found that AI readiness in public audit institutions is shaped by the interplay of technological capacity, data governance, cybersecurity preparedness, and institutional pressures, with the interplay of internal capacities and external influences being critical (ScienceDirect, 2025). In Zimbabwe, Chilunjika and Chilunjika

(2024) identify three interconnected pillars of AI readiness: infrastructure readiness, institutional coordination, and human capital development. ECDPM's (2024) regional review further identifies compliance with data protection frameworks and the institutional capacity of data regulators as critical determinants of responsible AI adoption across Africa.

UNESCO's Readiness Assessment Methodology (RAM, 2023) provides a structured instrument for assessing AI readiness across dimensions including national AI strategy, data protection legislation, public sector capacity, and due process frameworks. The UNESCO Program on AI and Digital Transformation for the Public Sector trained 80 Nigerian civil servants from across MDAs in February 2025 on AI governance, data openness, cybersecurity, and digital project management, and explicitly identified three overarching barriers: cultural and organizational resistance, data and infrastructure deficits, and human resource capacity gaps (UNESCO, 2025). The Program's finding that digital competency development must become a top priority for the success of government digital projects directly implicates the MDA system as a primary site of intervention.

2.4 The Nigerian Regulatory and Policy Landscape for AI

Nigeria's normative framework for AI and digital governance has evolved considerably in recent years. The Nigeria Data Protection Act (NDPA) 2023 and the establishment of the Nigeria Data Protection Commission (NDPC) constitute landmark developments, providing the legal bedrock for responsible AI deployment (Digital Nemko, 2025). The National Digital Economy and E-Governance Act 2024 further consolidated the legal framework for digital public services (OGP, 2024). At the legislative level, the National AI and Robotics Sciences Bill and the Control of Usage of Artificial Intelligence Technology Bill—both introduced in the House of Representatives in 2023—signal growing parliamentary attention to AI governance, though neither has yet completed the legislative cycle (IAPP, 2026). The forthcoming National AI Strategy, expected to be finalised between late 2025 and early 2026 and aligned with the African Union's Continental AI Strategy (2024), will provide the overarching policy framework for AI governance across MDAs (Digital Nemko, 2025).

The CBN, NCC, and NITDA are found to be the most active regulatory actors in shaping AI deployment. The CBN sandbox (launched 2023, expanded 2024–2025) now evaluates model explainability, fairness, and consumer transparency before granting approvals for AI-powered fintech tools (Digital Nemko, 2025). The U.S.-Nigeria joint AI and digital skills framework (U.S. Department of Commerce, 2024) and Nigeria's endorsement of the Africa Declaration on Artificial Intelligence at the Kigali AI Summit in April 2025 (Global Center for AI, 2025) further underscore the international dimension of Nigeria's AI governance trajectory.

3.0 Theoretical Framework

3.1 The Technology-Organization-Environment (TOE) Framework

This paper is anchored in the Technology-Organization-Environment (TOE) framework, originally developed by Tornatzky and Fleischer (1990) and subsequently adapted across numerous studies of technology adoption in organizational contexts (Baker, 2011; Pulkkinen et al., 2025; Pinto et al., 2024). The TOE framework posits that an organization's decision to adopt and implement a technology is shaped by three contextual dimensions: the technological context (internal and external technologies relevant to the organization); the organizational context (characteristics of the organization including

size, managerial structure, resources, and human capital); and the environmental context (the regulatory environment, competitive pressures, and external institutional forces within which the organization operates).

The TOE framework has been extensively validated in studies of AI adoption in public sector organizations. A meta-analysis by Pinto et al. (2024) of 12 empirical studies confirmed that organizational readiness and management support, government support and competitive pressure, and technological infrastructure are the strongest predictors of AI adoption. In a comparative study of AI readiness in Kenyan government institutions, the TOE framework augmented by Dynamic Capability theory revealed significant variations in readiness across central ministries, county governments, and regulatory bodies, necessitating tailored AI strategies (CEUR-WS, 2024). Pumplun et al. (2019), whose AI-adapted TOE framework is applied in several public sector AI adoption studies, provide a canonical basis for applying the framework in governmental contexts (Tandfonline, 2022). For the purposes of this paper, the TOE framework is operationalized as follows:

- i. Technological context: Digital infrastructure, data quality and availability, cybersecurity capacity, interoperability of ICT systems, and access to AI-enabling technologies within Nigerian MDAs.
- ii. Organizational context: Leadership commitment, digital literacy and human capital, organizational culture, change management capacity, and financial resources available to MDAs.
- iii. Environmental context: Regulatory frameworks, government policy and political will, inter-agency collaboration, citizen trust, and international partnerships shaping MDA AI adoption.

3.2 Institutional Theory

The TOE framework is complemented by Institutional Theory (DiMaggio & Powell, 1983), which draws attention to coercive, normative, and mimetic pressures shaping technology adoption in public organizations. In the Nigerian context, coercive pressures from presidential directives and regulatory mandates interact with normative pressures from professional standards bodies and mimetic pressures to emulate digital governance innovations in comparable countries shaping MDA responses to AI imperatives. Institutional Theory helps explain the documented tendency of Nigerian MDAs to adopt digital tools ceremonially in form rather than substantive practice a phenomenon well-documented in developing-country e-governance research (Adetunji et al., 2021).

3.3 Dynamic Capability Theory

Dynamic Capability Theory (Teece et al., 1997) further enriches the analysis by highlighting the importance of an organization's capacity to sense, seize, and reconfigure resources in response to technological change. In the AI governance context, dynamic capabilities manifest as the ability of MDAs to identify AI-relevant use cases, mobilize appropriate resources, and reorganize institutional structures to accommodate AI-driven processes—capacities presently underdeveloped in most Nigerian MDAs (UNESCO, 2025). Together, these three theoretical perspectives form a coherent and multi-level analytical architecture for assessing institutional preparedness.

4.0 Methodology

This paper adopts a conceptual research design, by synthesizing theoretical perspectives, identifying conceptual gaps, and developing frameworks that guide future empirical inquiry (Jaakkola, 2020; Gilson & Goldberg, 2015). Conceptual papers are distinguished by their orientation towards theoretical development and their reliance on systematic engagement with existing knowledge, rather than the generation of new primary data (Cropanzano, 2009; Rocco & Plakhotnik, 2009). This design is appropriate given the nascent state of empirical AI-readiness research in the Nigerian MDA context and the need to establish a theoretically grounded foundation for subsequent quantitative and qualitative investigations.

The paper draws its data via secondary sources including peer-reviewed of previous academic literature, official government policy documents were sourced from NITDA, the BPSR, the Office of the Head of the Civil Service of the Federation, and the NDPC, as well as relevant international organizations including UNESCO, the Open Government Partnership, the African Union, and the U.S. Department of Commerce and credible institutional reports from bodies such as Oxford Insights, the OECD, ECDPM, IFAC, and the Global Center for AI were incorporated to contextualize Nigeria's AI governance trajectory within comparative global and continental frameworks

5.0 Institutional preparedness in Nigerian MDAs

5.1 Technological Context: Infrastructure Deficits and Data Governance Gaps

The technological context of Nigerian MDAs is characterised by a paradox: visible investment in digital infrastructure coexisting with persistent structural deficits that constrain AI operationalisation. NITDA's SRAP 1.0 established over 683 digital infrastructure projects between 2021 and 2024 (OGP, 2024), and the EU-Nigeria Digital Economy Package committed over €820 million—comprising €160 million in grants and €660 million in loans—to support Nigeria's digitisation agenda (U.S. Trade, 2024). Internet penetration has accelerated to approximately 55% by 2024. Yet the quality and reliability of this infrastructure remains uneven, with persistent power supply deficits, inadequate bandwidth in non-urban areas, and significant disparities between federal and subnational MDA technological capacity.

Data governance constitutes perhaps the most critical technological prerequisite for AI-driven governance. AI systems require large volumes of high-quality, structured, and interoperable data—conditions presently absent in most Nigerian MDAs, where manual record-keeping, fragmented databases, and poor metadata management remain prevalent (UNESCO, 2025; Adetunji et al., 2021). The NDPC has noted that over 90% of Nigeria's data is hosted abroad (NITDA, 2025), signalling both a data sovereignty concern and a data infrastructure gap. The Nigeria Data Exchange (NGDX) framework, currently under development, aims to establish interoperability standards across MDA data systems, with rollout anticipated in early 2026 (Guardian Nigeria, 2025). Cybersecurity capacity represents a further vulnerability; NITDA's AI Transformation Roadmap (March 2025) explicitly acknowledges that the vulnerability of digital systems to cybersecurity threats and data breaches constitutes a critical risk for AI deployment across MDAs, necessitating dedicated AI security officers and robust governance frameworks (Punch, 2025).

5.2 Organisational Context: Human Capital, Leadership, and Cultural Barriers

The organisational context of Nigerian MDAs presents a constellation of barriers to AI adoption deeply embedded in the structure and culture of the Nigerian civil service. UNESCO (2025) identifies human resource capacity gaps—characterised by insufficient AI and digital skills, compounded by low investment in digital training and poor adaptation of procured technologies to organisational needs—as one of three principal barriers to digital transformation in Nigerian government. This is consistent with findings from NITDA's DL4ALL initiative, which targets 95% digital literacy by 2030, with a mid-term goal of 70% by 2027, but whose initial implementation encountered challenges including limited access to official email accounts among civil servants—illustrating the depth of the organisational readiness deficit (NITDA, 2026).

Leadership commitment is a critical organisational predictor of AI adoption. Research consistently demonstrates that without visible and sustained leadership support, AI initiatives in public organisations are susceptible to bureaucratic inertia, resource reallocation, and implementation drift (Madzík et al., 2024; Pinto et al., 2024). In the Nigerian context, leadership commitment to digital transformation has historically been episodic, contingent on individual ministerial tenure rather than institutionalised in durable organisational structures (Adetunji et al., 2021). The Head of the Civil Service of the Federation's announcement of plans to transition ministries and extra-ministerial departments to paperless operations by December 2025 represents a positive leadership signal (NITDA, 2026); however, the practical implementation of this commitment across diverse MDA contexts, many of which lack basic connectivity, remains to be demonstrated.

Organisational culture constitutes a further structural barrier. UNESCO (2025) identifies cultural and organisational resistance—manifested as reluctance to experiment, limited innovation orientation, and inadequate leadership support—as a primary driver of digital transformation failure. In the Nigerian civil service, this resistance is compounded by patronage networks, risk-averse administrative cultures, and entrenched routines incompatible with the process redesign demands of AI integration. The phenomenon of isomorphic adoption—adopting digital tools ceremonially to conform to external expectations without substantively transforming administrative processes—has been documented in Nigerian e-governance initiatives (Adetunji et al., 2021) and represents a particular risk in AI adoption. The Federal Government's plan to train over 500,000 public servants in emerging technologies (Legal Trove, 2025) is promising; however, effective institutional embedding of AI competencies requires systematic organisational reform—including appropriate incentive structures, work environment redesign, and performance management frameworks—beyond training alone.

5.3 Environmental Context: Regulatory Frameworks, Political Will, and External Partnerships

The environmental context shapes the opportunity structure within which Nigerian MDAs navigate AI adoption. The NDPA 2023, the National Digital Economy and E-Governance Act 2024, and the forthcoming National AI Strategy represent significant advances establishing a normative framework for responsible AI deployment (Digital Nemko, 2025; OGP, 2024). The NDPC's expanding enforcement capacity through audits and compliance notices in 2024–2025 further strengthens regulatory pressure on MDAs to comply with data protection obligations that are foundational to responsible AI (Digital Nemko, 2025). However, as IAPP (2026) notes, a dedicated AI Act

comparable to the EU's 2024 AI Act remains absent, creating a regulatory gap that may lead to inconsistent AI governance practices across the MDA system.

Political will remains both the most consequential and most variable environmental factor. The Tinubu administration's Renewed Hope Agenda explicitly references AI as a tool for public sector reform and institutional modernisation (Punch, 2025). The government's announcement in May 2025 of plans to deploy AI and blockchain across MDAs, and the inauguration of a committee to drive Nigeria's digital transformation, signal sustained executive interest (BPSR, 2025). The critical challenge, however, lies in translating political declarations into sustained, adequately resourced implementation programmes that survive administrative changes and political cycles—a perennial vulnerability of reform initiatives in Nigeria's public sector (Adetunji et al., 2021).

External partnerships constitute a significant enabling factor. The UNESCO Programme on AI and Digital Transformation for the Public Sector, the EU-Nigeria Digital Economy Package, and the U.S.-Nigeria joint AI and digital skills framework collectively provide financial resources, technical expertise, and capacity-building infrastructure augmenting the limited domestic resources of Nigerian MDAs (UNESCO, 2025; U.S. Department of Commerce, 2024). NITDA's plans to establish AI research centres across Nigeria's six geopolitical zones further demonstrate an intent to decentralise and institutionalise AI innovation (Legal Trove, 2025). However, the risk of dependency on external support—and the fragility of domestically sustained AI governance when international partnerships wane—constitutes a structural vulnerability requiring deliberate domestication strategies and adequate domestic budgetary allocation for AI governance.

5.4 Cross-Cutting Governance Challenges in the MDA Architecture

The architecture of Nigerian MDAs presents distinctive governance challenges that complicate system-wide AI adoption. The MDA system is characterised by fragmentation—with hundreds of ministries, departments, and agencies operating under varying enabling statutes, funding structures, and reporting relationships—creating significant coordination challenges for horizontal AI initiatives (BPSR, 2025). Corruption and accountability deficits within the MDA system represent environmental factors with direct technological implications: manual procurement processes, cash-based transactions, and opaque financial management create conditions structurally hostile to the transparency and auditability requirements of AI systems (IFAC, 2023). While e-governance tools such as the TSA and GIFMIS have made measurable contributions to financial transparency, the persistence of informal practices and weak enforcement of digital compliance mandates undermine the data integrity on which AI systems depend.

AI governance in the Nigerian MDA context also raises critical ethical concerns. Varon et al. (2022) and Ricaurte (2022), as reviewed by Radars/ResearchRound (2025), argue that AI systems can perpetuate existing power imbalances and marginalise underrepresented groups when deployed without appropriate safeguards. The National Gender Digital Inclusion Strategy (NGDIS) 2024–2027 launched by NITDA and the Federal Ministry of Women Affairs acknowledges gender-based digital exclusion as a governance challenge (ResearchRound, 2025). Ensuring that AI governance frameworks for Nigerian MDAs are designed with explicit attention to equity, inclusion, and non-discrimination is therefore not merely an ethical aspiration but a governance imperative.

6.0 Proposed Conceptual Framework: The MDA-AI Readiness Assessment Model (MARAM)

Drawing on the foregoing theoretical and empirical synthesis, this paper proposes a conceptual framework—the MDA-AI Readiness Assessment Model (MARAM)—for evaluating and enhancing institutional preparedness for AI-driven e-governance in Nigerian MDAs. MARAM integrates the TOE framework's three analytical dimensions with an explicit governance layer, reflecting the centrality of political will, accountability, and inter-institutional coordination in the Nigerian public sector context. The framework posits that sustainable AI-readiness in Nigerian MDAs is a function of four interconnected readiness pillars:

Pillar 1: Technological Infrastructure Readiness

This pillar encompasses digital connectivity and bandwidth, data quality and management systems, cybersecurity capacity, interoperability of existing ICT platforms, and access to AI-enabling technologies. It requires MDAs to conduct structured digital infrastructure audits and establish minimum data governance standards as prerequisites for AI deployment, informed by the NGDX framework and NITDA's SRAP 2.0.

Pillar 2: Human Capital and Organizational Readiness

This pillar addresses the digital literacy and AI competency of civil servants, leadership commitment and change management capacity, organisational culture orientation towards innovation, and the availability of dedicated AI governance roles—including Chief AI Officers and AI Security Officers as recommended by the BPSR (2025). It requires structured capacity-building programmes integrated into civil service training curricula and linked to performance management frameworks that incentivise digital competency.

Pillar 3: Regulatory and Policy Readiness

This pillar encompasses the comprehensiveness and enforceability of AI governance legislation, data protection frameworks, inter-agency regulatory coordination, and alignment with continental and global AI governance standards. It requires Nigeria to complete and operationalise its National AI Strategy, strengthen NDPC enforcement capacity, and establish a coordinated multi-regulator AI governance architecture spanning NITDA, NCC, CBN, and sectoral ministries.

Pillar 4: Governance and Accountability Readiness

This pillar addresses the integrity of administrative processes, transparency mechanisms, citizen trust, and accountability structures governing AI system deployment and outcomes. It requires embedding AI ethics principles—including fairness, transparency, explainability, and non-discrimination—into MDA governance frameworks, and establishing citizen-facing accountability mechanisms for AI-mediated service delivery decisions. It also encompasses gender-responsive and inclusion-sensitive AI design standards.

The four pillars of MARAM are conceived as interdependent and mutually reinforcing: deficiencies in any single pillar generate cascading constraints across the others. Infrastructure deficits undermine the utility of capacity-building investments; leadership resistance negates regulatory progress; poor data governance compromises accountability; and corruption undermines trust in AI systems regardless of technical sophistication. MARAM therefore advocates a holistic, coordinated institutional reform approach rather than piecemeal technological interventions. The framework is also

intended to be adaptive, capable of being operationalised through a standardised assessment instrument—the MDA-AI Readiness Scorecard—that enables longitudinal tracking and inter-MDA benchmarking.

7.0 Conclusion and Policy Implications

This paper has examined the institutional preparedness of Nigerian Ministries, Departments and Agencies (MDAs) for AI-driven e-governance transformation through the analytical lens of the Technology-Organisation-Environment (TOE) framework, supplemented by Institutional Theory and Dynamic Capability Theory. The analysis reveals a governance system at a critical juncture: characterised by significant policy ambition and an emerging regulatory architecture on one hand, and persistent structural deficits in digital infrastructure, human capital, data governance, and organisational culture on the other. The central argument advanced is that institutional preparedness for AI-driven e-governance cannot be reduced to a technological problem. It is fundamentally a governance challenge that demands coordinated reform across the technological, organisational, and environmental dimensions of the Nigerian public sector. The proposed MDA-AI Readiness Assessment Model (MARAM) offers a theoretically grounded and contextually adapted framework for this purpose, providing a structured instrument for systematic readiness assessment and a roadmap for holistic institutional reform across the four interdependent pillars of technological infrastructure, human capital, regulatory coherence, and governance accountability.

The paper acknowledges its inherent limitations as a conceptual study: the absence of primary data from Nigerian MDAs means that MARAM's applicability and validity require empirical testing. Future research should conduct structured quantitative surveys and qualitative case studies of AI-readiness across a representative sample of Nigerian MDAs, enabling comparative analysis and the identification of MDA-specific reform pathways. Longitudinal studies tracking the evolution of AI-readiness across successive reform cycles would further enrich the evidence base. The findings are ultimately hopeful: Nigeria possesses the policy instruments, the institutional architecture, and the international partnerships required to achieve meaningful AI-driven governance transformation. What is required now is the political will, institutional discipline, and sustained domestic investment to translate these assets into demonstrable public value for all Nigerians.

The findings of this paper carry several practical implications for policymakers and public sector administrators in Nigeria:

- i. NITDA and BPSR should develop a standardised MDA-AI Readiness Assessment Tool grounded in MARAM to conduct systematic baseline assessments of institutional preparedness across all MDAs before AI deployment, enabling evidence-based prioritization of investment and capacity-building.
- ii. The Office of the Head of the Civil Service of the Federation should integrate AI governance competencies into the National Civil Service Learning and Development Strategy, establishing minimum digital literacy standards as a condition for senior officer career progression, and mandating AI ethics training for all officers in data-intensive roles.
- iii. The National Assembly should accelerate the completion of Nigeria's National AI Strategy and the passage of the AI governance legislative bills introduced in 2023, establishing a clear legal

framework for AI in the public sector that gives specific effect to the NDPA 2023 in AI-mediated decision-making contexts.

- iv. A Multi-Regulator AI Governance Council—spanning NITDA, NCC, CBN, NAFDAC, and relevant sectoral ministries—should be established to harmonise AI governance standards, prevent regulatory fragmentation, and provide unified guidance to MDAs on AI deployment compliance and ethical safeguards.
- v. MDAs should establish internal AI Ethics Committees, tasked with reviewing AI use cases, auditing algorithmic decision-making, and ensuring compliance with data protection obligations, with mandatory annual reporting to the NDPC—ensuring accountability at the institutional level.
- vi. Nigeria should intensify engagement with the African Union's Continental AI Strategy (2024) and the Kigali Africa Declaration on AI (2025) to leverage continental solidarity, shared open datasets, and regional governance architectures that reduce dependence on external technology providers and promote data sovereignty.
- vii. Future budgetary frameworks should include dedicated AI governance line items for each MDA, ensuring that digital transformation ambitions are backed by sustained domestic resource allocation rather than relying predominantly on donor and external partnership funding.

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