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Artificial Intelligence-Driven Digital Transformation in the Public Sector: Pathways to Efficient, Transparent, and Sustainable Governance

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ABSTRACT

This study titled "Artificial Intelligence-Driven Digital Transformation in the Public Sector: Pathways to Efficient, Transparent, and Sustainable Governance" investigates how AI adoption fosters innovation and efficiency within Nigeria's public administration. Anchored on Sociotechnical Systems Theory (STS) and Public Value Theory, the study explores how the integration of AI technologies enhances operational efficiency, transparency, and sustainability, while assessing the institutional and human capacity challenges influencing implementation. A mixed-method research design was adopted, combining quantitative surveys and qualitative interviews across 217 purposively selected respondents from key Nigerian ministries, departments, and agencies (MDAs). Data were analyzed using descriptive and inferential statistics (regression and ANOVA) alongside thematic content analysis for qualitative insights. Findings reveal that AI adoption significantly enhances digital transformation outcomes ($R^2 = 0.929$, $F = 2809.694$, $p < 0.05$), demonstrating strong positive effects on efficiency, service delivery, and modernization. Human and institutional capacities jointly accounted for 95.8% of the variance in public administration processes ($R^2 = 0.958$, $F = 2447.378$, $p < 0.05$), indicating their critical role in AI integration. Furthermore, AI-driven strategies explained 93.1% of the variance in sustainable governance frameworks ($R^2 = 0.931$, $F = 2922.588$, $p < 0.05$), confirming that AI substantially contributes to transparency, accountability, and long-term sustainability. The study concludes that effective AI adoption transforms governance practices by promoting efficiency and accountability. It recommends expanding AI deployment across public institutions, strengthening institutional and human capacity through continuous training, and implementing strategic AI-based governance frameworks to ensure sustainable digital transformation in Nigeria's public sector.

Introduction

Background to the Study

Artificial Intelligence (AI) is fundamentally transforming public sector governance by fostering digital transformation that enhances efficiency, transparency, and sustainability. As governments worldwide seek to modernize administrative processes, AI technologies are increasingly being leveraged to automate tasks, optimize decision-making, and improve service delivery (Yang, 2024). According to Yang (2024), digital transformation significantly boosts governmental efficiency and accountability, addressing long-standing performance gaps within public administration. Similarly, Chinchamalatpure (2025) explores the integration of AI in public sector governance and emphasizes its potential to streamline bureaucratic operations, enhance responsiveness, and reduce inefficiencies associated with traditional governance structures.

Furthermore, the Organisation for Economic Co-operation and Development [OECD] (2025) positions AI as a catalyst for accelerating the digital government agenda, noting that governments are now not only regulators but also developers and users of AI-driven systems. This paradigm shift reflects a broader movement toward smarter, data-informed governance models that rely on predictive analytics, automation, and citizen-centric innovation. However, these advancements are tempered by significant implementation challenges. Outdated IT infrastructure, poor data quality, and a shortage of skilled digital professionals remain major obstacles to effective AI adoption in the public sector (The Guardian, 2025).

Artificial Intelligence (AI) is increasingly being integrated into public administration as a fundamental driver of digital transformation. It promises to automate routine bureaucratic tasks, extract actionable insights from vast administrative datasets, and redesign service delivery around citizen-centric models. According to the Organisation for Economic Co-operation and Development (OECD, 2025), AI has the potential to enhance the efficiency, accuracy, and responsiveness of internal governmental processes, thereby fostering data-driven and proactive policymaking. In line with this, Zhang (2025) observes that many governments have begun deploying AI tools in areas such as service triage, fraud detection, and predictive maintenance to

improve decision-making, minimize operational costs, and increase administrative responsiveness reshaping the traditional structures of governance in the process.

However, realizing these benefits requires more than the mere deployment of AI models. It demands robust organizational readiness, reliable data quality, modern digital infrastructure, and visionary leadership to drive adoption. As highlighted by The Guardian (2025), several governments continue to face barriers such as outdated legacy IT systems, fragmented and low-quality datasets, poor procurement processes, and a shortage of skilled professionals in AI and data management. These systemic challenges often confine many AI initiatives to the pilot stage, preventing their full-scale implementation. Without strategic investment in digital infrastructure, governance reforms, and capacity building, AI programs risk leading to inefficiency, vendor dependency, and diminished public trust rather than true digital transformation (The Guardian, 2025).

Beyond operational efficiency, AI-driven transformation also raises critical concerns surrounding transparency, accountability, and sustainability. Both Zhang (2025) and OECD (2025) emphasize the necessity of developing explainable and auditable AI systems, establishing clear ethical guidelines, and formulating metrics that account for social and environmental impacts. Scholars further stress that governance frameworks must strike a balance between innovation and public accountability, ensuring that AI adoption strengthens democratic values rather than undermining them (Yang, 2024). Therefore, this study explores the technical, organizational, and regulatory pathways through which AI-driven digital transformation can foster efficient, transparent, and sustainable governance, while also addressing the associated risks, trade-offs, and enabling conditions required to achieve lasting public value (Zhang, 2025; OECD, 2025).

Problem

The adoption of Artificial Intelligence (AI) in Nigeria's public sector should drive comprehensive digital transformation by enhancing administrative efficiency, strengthening transparency, and promoting sustainable governance. AI has the potential to automate routine government operations, improve decision-making through data analytics, and ensure accountable service delivery to citizens. However, the current state of AI integration in Nigeria is slow, fragmented, and inconsistent, with many government agencies still reliant on manual processes, outdated ICT systems, and weak data infrastructure, resulting in inefficiency, bureaucratic delays, and limited public access to real-time information. Despite global advances in AI-enabled governance, Nigeria continues to lag due to minimal institutional capacity and inadequate policy frameworks to guide AI-driven transformation across ministries, departments, and agencies. Although initiatives such as the National Information Technology Development Agency (NITDA) and the Nigeria Data Protection Commission have been established to promote e-governance and digital innovation, these efforts have not yet translated into significant AI-enabled improvements in transparency, accountability, or sustainability. Most existing studies focus on general digital governance or e-administration, leaving a critical knowledge gap regarding the specific pathways and conditions necessary for AI to effectively transform governance. If these gaps are not addressed, the Nigerian public sector may continue to face inefficiency, corruption, poor service delivery, and unsustainable administrative practices, ultimately undermining national development objectives and citizen trust in government institutions.

Objectives of the Study

The main objective of this study is to examine how Artificial Intelligence (AI) drives digital transformation in the Nigerian public sector to achieve efficient, transparent, and sustainable governance. Specifically, the study aims to:

1. To examine the influence of Artificial Intelligence (AI) adoptionondigital transformation outcomes in the Nigerian public sector.

2. To investigate how institutionaland human capacity challenges affect the effective integration of AI into public administration processes in Nigeria.

3. To analyze the impact of AI-driven digital transformation strategies and frameworks on the enhancement of sustainable governance within Nigeria's public sector.

Significance of the Study

This study is significant as it provides critical insights into how Artificial Intelligence (AI) can drive digital transformation in Nigeria's public sector to enhance efficiency, transparency, and sustainability in governance. It bridges the gap between theoretical perspectives on digital governance and the practical realities of AI implementation in developing economies. The findings will assist policymakers in developing evidence-based strategies for integrating AI across government institutions, while offering public administrators a framework for improving service delivery, data-driven decision-making, and accountability. Additionally, development partners, private tech firms, and NGOs can leverage the insights to strengthen collaboration and capacity-building efforts. The study also serves as a valuable reference for scholars exploring the intersection of AI, digital transformation, and governance in emerging economies.

Scope of the Study

This study examines the role of Artificial Intelligence (AI) in driving digital transformation in Nigeria's public sector, focusing on its impact on efficiency, transparency, and sustainability in governance. It covers selected federal and state ministries, departments, and agencies (MDAs) implementing or planning digital initiatives, assessing the extent of AI adoption, challenges such as institutional, technological, and human capacity constraints, and

strategies for optimizing AI-driven governance. The study focuses on areas like administrative automation, data-driven decision-making, and public service delivery, excluding private sector applications. Geographically limited to Nigeria, it draws on global best practices and emphasizes developments between 2020 and 2025 to provide a current view of AI-driven digital transformation trends and challenges.

Concepts

Adoption of Artificial Intelligence (AI)

Adoption of Artificial Intelligence (AI) refers to the systematic integration of technologies like machine learning, natural language processing, and predictive analytics into public sector operations to enhance efficiency, policymaking, and service delivery (Mergel, 2024; OECD, 2025). Effective AI adoption relies on robust data infrastructure, skilled human capacity, and sound governance rather than the mere use of digital tools. Globally, governments use AI for fraud detection, predictive maintenance, and automated case processing (Zhang, 2025; McKinsey, 2025), but success often varies due to weak institutional readiness and outdated systems (Ogunbodede, 2025). In Nigeria's public sector, AI is viewed as a catalyst for efficient, transparent, and sustainable governance, accelerating decision-making and promoting accountability, though poor coordination and weak structures can limit its impact (Brookings, 2024; OECD, 2025).

Institutional Challenges

Institutional challenges are the organizational, policy, and governance barriers that hinder effective adoption and management of Artificial Intelligence (AI) in public institutions (The Guardian, 2025). These include weak policy frameworks, outdated systems, poor accountability, and resistance to change (Mergel, 2024; Public Accounts Committee/UK, 2025). In Nigeria, such barriers ranging from fragmented mandates to limited data interoperability often prevent AI projects from scaling beyond pilot stages (Brookings, 2024; Ogunbodede, 2025). While reforms like data protection laws and AI strategies exist, gaps in coordination, enforcement, and leadership persist. Strengthening institutional capacity, policy coherence, and inter-agency collaboration is crucial for achieving efficient, transparent, and sustainable AI-driven governance (OECD, 2025).

Human capacity challenges

Human capacity challenges refer to the deficiencies in skills, digital literacy, organizational roles, and leadership required to effectively design, implement, govern, and sustain Artificial Intelligence (AI) systems within the public sector. These challenges manifest through shortages of technical experts such as data scientists and machine learning engineers, low levels of AI literacy among policymakers and administrators, inadequate training programs, poor retention of skilled personnel due to private-sector competition, and limited institutional capacity for oversight, evaluation, and ethical regulation (OECD, 2025; UNESCO, 2025). The lack of both specialized and managerial expertise often leads to poorly designed or mismanaged AI initiatives, resulting in biased outcomes, weak adoption, and project failures. Within this study, human capacity is considered a critical enabler of AI-driven digital transformation, as human expertise not algorithms alone determines whether technology generates public value. Enhancing technical and managerial competencies, establishing professional development pathways, and creating leadership roles for AI governance (e.g., Chief Data or AI Officers) are essential to ensure efficiency, transparency, and sustainability. Therefore, examining Nigeria's current capacity landscape training programs, leadership preparedness, and workforce retention provides key insights for designing capacity-building strategies and policy interventions that promote responsible and scalable AI adoption in the public sector.

AI-Driven Digital Transformation Strategies

AI-driven digital transformation strategies are comprehensive, organization-wide frameworks that integrate Artificial Intelligence (AI), data analytics, and emerging digital technologies to reengineer public-sector processes for improved efficiency, transparency, and citizen-centered service delivery. These strategies align technological investments with institutional objectives, enabling automation, data-informed decision-making, and enhanced accountability. As McKinsey & Company (2025) explains, successful AI-driven strategies are anchored on clearly defined use cases, scalable infrastructure, and strong governance structures that promote inclusivity and long-term sustainability. Guenduez (2025) further stresses that effective strategies institutionalize digital capabilities through leadership commitment, data interoperability, and continuous human capacity development rather than relying on fragmented pilot projects. Within this study, AI-driven transformation strategies are crucial because they provide the roadmap through which Nigeria's public sector can realize efficient, transparent, and sustainable governance. Without a coherent strategic framework, AI adoption risks becoming disjointed, inefficient, and overly dependent on external vendors. Conversely, well-formulated strategies can accelerate implementation, enhance fiscal accountability, and strengthen public trust—making them a cornerstone of meaningful digital transformation in governance.

Digital Transformation Outcomes

Digital transformation outcomes refer to the tangible improvements that occur when public-sector institutions integrate digital technologies particularly Artificial Intelligence (AI) into their operations, service delivery, and governance systems. These outcomes include enhanced service accessibility, reduced transaction times, data-informed policymaking, cross-agency interoperability, and strengthened transparency and citizen engagement (OECD, 2025). According to Szedmák (2025) and the OECD's Government at a Glance (2025), realizing these benefits requires more than adopting technology

it depends on coherent strategies, interoperable data systems, and institutional capacity that enable digital initiatives to scale effectively. In this study, digital transformation outcomes are crucial because they connect AI adoption to the core governance objectives of efficiency, transparency, and sustainability. Evidence from international analyses (OECD, 2025; McKinsey, 2025) shows that AI can drive predictive service delivery, automated case management, and real-time monitoring when supported by strong data governance, digital infrastructure, and skilled personnel. Assessing these outcomes in Nigeria's public sector will thus help determine whether AI investments are translating into meaningful public value or remaining fragmented, unscalable efforts.

Sustainability in Public Sector Governance

Sustainability in public sector governance integrates environmental, fiscal, and institutional dimensions emphasizing eco-efficient operations, prudent long-term investments, and resilient institutions that safeguard public value for future generations (Deloitte, 2025). In the context of Artificial Intelligence (AI), sustainability involves evaluating the environmental impact of compute-intensive systems, the fiscal viability of long-term maintenance, and the institutional robustness that ensures continuous capacity building and ethical oversight (Maghsoudi, 2025; Chen, 2025). Scholars highlight that sustainable AI policy must balance immediate productivity gains with lifecycle considerations—such as energy consumption, data infrastructure, and equitable access so that digital transformation reinforces, rather than undermines, public value (OECD, 2025). For this study, sustainability is examined as a key measure of whether Nigeria's AI-driven digital transformation generates enduring and inclusive outcomes. This entails assessing lifecycle costs, institutional governance mechanisms, and capacity development to prevent vendor dependency and ensure low-risk, high-value digital governance (Deloitte, 2025; World Bank, 2024). Through this lens, sustainable AI adoption becomes not only a technological goal but also a strategic framework for fostering resilient, transparent, and environmentally responsible public institutions.

Theoretical Framework

Sociotechnical Systems Theory (STS)

The Sociotechnical Systems Theory (STS), introduced by Trist and Bamforth (1951) and expanded by Bostrom and Heinen (1977), emphasizes the joint optimization of social (people, culture, structure) and technical (tools, systems, processes) subsystems for successful technological implementation. Applied to this study on AI-driven digital transformation in the public sector, STS highlights that effective AI adoption requires aligning technology with institutional structures, workflows, and human competencies. It shows that efficiency, transparency, and sustainability in governance emerge when AI systems work in harmony with people, policies, and leadership. Thus, the theory guides this study in assessing how institutional readiness, capacity building, and adaptive governance shape AI outcomes in Nigeria's public sector.

Public Value Theory

The Public Value Theory (PVT), developed by Mark H. Moore (1995) in Creating Public Value: Strategic Management in Government, emphasizes that the primary role of public managers is to create outcomes that enhance citizens' well-being, build trust, and strengthen governmental legitimacy. Unlike traditional management models focused solely on efficiency, PVT integrates public outcomes, citizen legitimacy, and operational capability. In this study, PVT provides a framework for evaluating how AI-driven digital transformation generates public value in Nigeria's public sector by improving service delivery, transparency, and sustainability. It highlights the need for ethical governance, public trust, and participatory oversight, underscoring that AI should serve as both a technological and governance tool for achieving efficiency, accountability, and long-term societal benefit.

Summary of Review

The reviewed empirical studies collectively underscore that successful AI-driven digital transformation in Nigeria public sector depends on the interplay of institutional readiness, human capacity, and strategic governance frameworks. Anazodo and Ezenwegbu (2025) revealed that while public servants show strong enthusiasm toward AI adoption, inadequate ICT infrastructure, limited technical competence, and weak data governance continue to hinder full integration. Similarly, Adedinsewo, Akinyemi, and Bello (2025) demonstrated that technical performance alone is insufficient for sustainable outcomes, as effective AI deployment in low-resource environments requires sociotechnical maturity, local adaptation, and continuous monitoring. Complementing these insights, Opadele, Kehinde, Abdul, Afolabi, Mukhopadhyay, and Adereni (2024) provided concrete evidence that AI applications when operationally embedded and government- supported can yield measurable improvements in service efficiency, as reflected in the 30.3% increase in child vaccination coverage. Collectively, these studies affirm that Nigeria path toward efficient, transparent, and sustainable governance through AI lies in adopting coherent digital strategies, strengthening institutional capacity, and embedding AI systems within well-governed, human-centered frameworks that maximize public value.

Methodology

Research Design

This study adopts a mixed-method research design, combining both quantitative and qualitative approaches to comprehensively investigate AI-driven digital transformation in Nigeria's public sector. The mixed-method approach facilitates triangulation, allowing quantitative data to capture measurable patterns of AI adoption, efficiency, transparency, and sustainability, while qualitative insights explore institutional, behavioral, and contextual factors influencing AI implementation (Creswell & Plano Clark, 2018). The study employs a comparative case study strategy, examining multiple ministries and agencies to understand variations in AI utilization and governance outcomes. This design aligns with Yin's (2018) assertion that case studies are effective for analyzing complex, real-world phenomena where the boundaries between the phenomenon and context are blurred, as in the adoption of AI in public administration.

Population and Sample

The population of this study comprises 500 public administrators, ICT officers, and policymakers from Nigerian ministries, departments, and agencies (MDAs) actively implementing AI or digital governance initiatives, particularly in the finance, health, education, and public service management sectors (OECD, 2025). Using the Krejcie and Morgan (1970) formula, a statistically justifiable sample of 217 respondents was determined. A purposive sampling technique will be employed to select information-rich cases, ensuring inclusion of both managerial and technical personnel whose experiences are critical to understanding AI adoption, institutional challenges, and its impact on efficiency, transparency, and sustainable governance (Patton, 2015). The sample will be proportionally drawn from the different sectors and roles to capture diverse perspectives on AI-driven digital transformation in the Nigerian public sector.

Data Collection Methods

Data will be gathered through structured surveys, semi-structured interviews, document analysis, and project case studies to ensure breadth and depth of information. Surveys will quantify perceptions of AI-driven improvements in governance outcomes, while interviews with administrators and ICT personnel will explore challenges, ethical concerns, and institutional readiness (Kvale&Brinkmann, 2015). Document analysis of AI policies, strategic plans, and government reports provides secondary data to contextualize findings and trace institutional commitments (Bowen, 2009). Case studies of specific AI deployments such as automated service delivery systems or predictive analytics platforms enable detailed examination of integration processes and governance impacts.

Validity and Reliability

The study ensures rigor through triangulation, comparing findings across data sources and methods (Denzin, 2012). Reliability is enhanced via pilot testing instruments, standardized data collection procedures, and consistent coding protocols. Validity is maintained through member-checking of interview transcripts and peer review of thematic findings. Ethical considerations include obtaining informed consent from all participants, anonym zing responses, and adhering to data protection standards (UNESCO, 2024 throughout the study.

Data Analysis Techniques

Quantitative data from surveys will be analyzed using descriptive statistics (mean, frequency, percentage) to summarize patterns of AI adoption and respondent characteristics, and inferential statistics such as regression and ANOVA to test relationships between AI integration and governance outcomes (Field, 2013).

Data Analysis

Regression

Table 1: Descriptive Statistics

	Mean	Std. Deviation	N
DigitalTransformationOutcomesinthe NigerianPublicSector	15.3065	4.85573	217
AdoptionofArtificialIntelligence	14.7742	4.73948	217

The descriptive statistics in Table 1 indicate that the respondents reported relatively high levels of both AI adoption and digital transformation outcomes in the Nigerian public sector, with mean scores of 14.77 and 15.31, respectively, on the measurement scales used. The standard deviations, 4.74 for AI adoption and 4.86 for digital transformation outcomes, suggest moderate variability in responses among the 217 participants, indicating that while most respondents perceive significant AI integration and digital transformation, there are some differences in the extent of experiences or perceptions across individuals.

Table 1.1:Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.964[a]	.929	.929	1.29760	.929	2809.694	1	215	.000	.094

a. Predictors: (Constant), AdoptionofArtificialIntelligence

b. Dependent Variable: DigitalTransformationOutcomesintheNigerianPublicSector

Table 1.1 presents the model summary of the regression analysis examining the influence of AI adoption on digital transformation outcomes in the Nigerian public sector. The model shows a very strong positive relationship, with an R value of 0.964 and an R^2 of 0.929, indicating that approximately 92.9% of the variance in digital transformation outcomes is explained by AI adoption. The adjusted R^2 of 0.929 confirms the model's robustness, while the standard error of 1.298 suggests a relatively low average prediction error. The F-change value of 2809.694 with a significance level of 0.000 indicates that the model is statistically significant, and the Durbin-Watson value of 0.094 suggests potential positive autocorrelation in the residuals, which may require further diagnostic checking.

Test of Hypothesis 1

Table 1.2: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4730.862	1	4730.862	2809.694	.000[b]
	Residual	362.009	215	1.684		
	Total	5092.871	216			

a. Dependent Variable: DigitalTransformationOutcomesintheNigerianPublicSector

b. Predictors: (Constant), AdoptionofArtificialIntelligence

Table 1.2 presents the ANOVA results for the regression model assessing the effect of AI adoption on digital transformation outcomes in the Nigerian public sector. The regression sum of squares (4730.862) and F-value of 2809.694 with a significance level of 0.000 indicate that the model is statistically significant, meaning AI adoption reliably predicts digital transformation outcomes. The residual sum of squares (362.009) shows the unexplained variance, which is minimal compared to the total variance (5092.871), further confirming a strong model fit.

Decision rule: If the significance value (Sig. = 0.000) is less than the alpha level ($\alpha = 0.05$), we reject the null hypothesis (H_0) that AI adoption has no effect on digital transformation outcomes and accept the alternative hypothesis (H_1) that AI adoption significantly influences digital transformation in the Nigerian public sector.

Analysis of Objective 2

Table2.1:Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.979[a]	.958	.958	1.15997	.958	2447.378	2	214	.000	.149

a. Predictors: (Constant), InstitutionalCapacity, HumanCapacity

b. Dependent Variable: PublicAdministrationProcessesinNigeria

Table 2.1 presents the model summary for the regression analysis examining the influence of institutional capacity and human capacity on public administration processes in Nigeria. The model shows a very strong relationship, with an R value of 0.979 and an R^2 of 0.958, indicating that approximately 95.8% of the variance in public administration processes is explained by institutional and human capacity. The adjusted R^2 of 0.958 confirms the robustness of the model, while the standard error of 1.160 suggests a low average prediction error. The F-change value of 2447.378 with a significance level of 0.000 indicates that the overall model is statistically significant. The Durbin-Watson value of 0.149 suggests potential positive autocorrelation in the residuals, which may require further diagnostic checking.

Test of Hypothesis 2

Table 2.2:ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6586.082	2	3293.041	2447.378	.000[b]
	Residual	287.945	214	1.346		
	Total	6874.028	216			

a. Dependent Variable: PublicAdministrationProcessesinNigeria

b. Predictors: (Constant), InstitutionalCapacity, HumanCapacity

Table 2.2 presents the ANOVA results for the regression model assessing the effect of institutional capacity and human capacity on public administration processes in Nigeria. The regression sum of squares (6586.082) and F-value of 2447.378 with a significance level of 0.000 indicate that the model is highly statistically significant, meaning that institutional and human capacity jointly predict public administration processes. The residual sum of squares (287.945) is minimal compared to the total variance (6874.028), reflecting a strong model fit.

Decision rule: Since the significance value (Sig. = 0.000) is less than the alpha level ($\alpha = 0.05$), we reject the null hypothesis (H_0) that institutional and human capacity have no effect on public administration processes, and accept the alternative hypothesis (H_1) that institutional and human capacity significantly influence public administration processes in Nigeria.

Analysis of Objective 3

Regression

Table 3.1:Model Summary[b]

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**					**Durbin-Watson**
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.965[a]	.931	.931	1.32854	.931	2922.588	1	215	.000	.113

a. Predictors: (Constant), AIDrivenDigitalTransformationStrategies

b. Dependent Variable: FrameworksontheEnhancementofSustainableGovernance

Table 3.1 presents the model summary for the regression analysis examining the impact of AI-driven digital transformation strategies on frameworks for the enhancement of sustainable governance in Nigeria. The model demonstrates a very strong positive relationship, with an R value of 0.965 and an R^2 of 0.931, indicating that approximately 93.1% of the variance in sustainable governance frameworks is explained by AI-driven strategies. The adjusted R^2 of 0.931 confirms the robustness of the model, while the standard error of 1.329 suggests relatively low prediction error. The F-change value of 2922.588 with a significance level of 0.000 indicates that the model is statistically significant, and the Durbin-Watson value of 0.113 suggests potential positive autocorrelation in the residuals, which may require further diagnostic examination.

Test of Hypothesis 3

Table 3.2: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5158.394	1	5158.394	2922.588	.000[b]
	Residual	379.477	215	1.765		
	Total	5537.871	216			

a. Dependent Variable: FrameworksontheEnhancementofSustainableGovernance

b. Predictors: (Constant), AIDrivenDigitalTransformationStrategies

Table 3.2 presents the ANOVA results for the regression model assessing the effect of AI-driven digital transformation strategies on frameworks for the enhancement of sustainable governance in Nigeria. The regression sum of squares (5158.394) and F-value of 2922.588 with a significance level of 0.000 indicate that the model is highly statistically significant, meaning that AI-driven strategies reliably predict the effectiveness of sustainable governance frameworks. The residual sum of squares (379.477) is small relative to the total variance (5537.871), reflecting a strong model fit.

Decision rule: Since the significance value (Sig. = 0.000) is less than the alpha level ($\alpha = 0.05$), we reject the null hypothesis (H_0) that AI-driven digital transformation strategies have no effect on sustainable governance frameworks, and accept the alternative hypothesis (H_1) that these strategies significantly influence the enhancement of sustainable governance in Nigeria.

Discussion of Findings

The analysis shows that AI adoption significantly and positively influences digital transformation in Nigeria's public sector, explaining about 92.9% of the variance in transformation outcomes ($R^2 = 0.929$, $F = 2809.694$, $p < 0.05$). This indicates that AI integration enhances efficiency, service delivery, and modernization, consistent with Dwivedi et al. (2021) and Janssen et al. (2022).

For the second objective, both human and institutional capacities were found to significantly affect public administration processes, jointly explaining 95.8% of the variance ($R^2 = 0.958$, $F = 2447.378$, $p < 0.05$). While human capacity scored slightly higher, institutional frameworks appear weaker, supporting findings by Kankanhalli et al. (2020) and Gil-Garcia et al. (2021) that strong institutions and skilled personnel are vital for effective AI integration.

Regarding the third objective, AI-driven digital transformation strategies were shown to significantly enhance sustainable governance, explaining 93.1% of its variance ($R^2 = 0.931$, $F = 2922.588$, $p < 0.05$). These strategies promote transparency, accountability, and sustainability—echoing Mergel et al. (2020) and Vogl et al. (2021). Overall, the study concludes that strategic AI application is key to advancing efficient, accountable, and sustainable governance in Nigeria's public sector.

Summary of Findings

1. The adoption of Artificial Intelligence (AI) significantly and positively influences digital transformation outcomes in the Nigerian public sector, enhancing efficiency, service delivery, and operational modernization.

2. Human capacity and institutional capacity jointly and significantly affect public administration processes, indicating that both skilled personnel and robust institutional frameworks are critical for effective AI integration in the public sector.

3. AI-driven digital transformation strategies significantly improve frameworks for sustainable governance, promoting transparency, accountability, and overall sustainability within Nigerian public sector institutions.

Conclusion

This study demonstrates that the adoption of Artificial Intelligence (AI) plays a pivotal role in driving digital transformation in the Nigerian public sector by enhancing efficiency, service delivery, and operational modernization. It further establishes that both human and institutional capacities are critical determinants of effective AI integration, highlighting the need for skilled personnel and robust institutional frameworks to optimize public administration processes. Additionally, the study confirms that AI-driven digital transformation strategies significantly strengthen frameworks for sustainable governance, fostering transparency, accountability, and long-term sustainability in public sector operations. In conclusion, the findings underscore that strategic implementation of AI, supported by capable human resources and strong institutional structures, is essential for achieving an efficient, transparent, and sustainable governance system in Nigeria.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. Enhance AI Adoption in Public Institutions: Nigerian public sector organizations should accelerate the adoption and integration of AI technologies across operations to further improve efficiency, service delivery, and operational modernization, ensuring that digital transformation initiatives are effectively implemented.

2. Strengthen Human and Institutional Capacity: Government agencies should invest in continuous training and capacity-building programs for public administrators and ICT personnel, while also reinforcing institutional frameworks and policies to support seamless AI integration and sustainable public administration processes.

3. Implement Strategic AI-Driven Governance Frameworks: Policymakers should design and institutionalize AI-driven digital transformation strategies that specifically target sustainable governance, emphasizing transparency, accountability, and long-term sustainability in public sector operations.

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