TECHNOLOGICAL INNOVATION AND PERFORMANCE OF AUDITING FIRMS IN NIGERIA (A STUDY OF BIG 4)

[1]; Onuoha Perpetua Ijeoma (Ph.D) and Utom Cynthia Ogbonne [1]

[1]Accountancy Department, Faculty of Management Sciences

Alex – Ekwueme Federal University Ndufu - Alike, Nigeria.

onuohaijeomaperpetua@gmail.com, ***07033548086***

OCID ID: 0000-0003-2224- 6186

[2]Accountancy Department, Faculty of Management Sciences

Ebonyi State University Abakaliki, Nigeria.

utomcynthia@gmail.com, ***08165521773***

Abstract

This study examined the influence of technological innovation on performance of auditing firms in Nigeria using the Big 4 firms as case study. In detail, this study aimed to evaluate the extent to which audit automation, ICT usage and new technologies affect auditing firms performance. Quantitative design research approach was used in this study and panel data covering years 2020-2025 were utilized. Data were created artificially and analyses was carried out using descriptive statistics, correlation analysis and multiple regression technique using E-View10.0 so as to examine the associations and influences of technological innovations on firm performance. Results indicate that the firm performance were reasonably high during the sample years, with high positive correlation between all the technological variables and performance. Also regression analysis results show that audit automation, ICT usage, new technologies have positive significant impact on performance and all these three variables together explain up to 98% of the variance in firm performance. The study concluded that technological innovation have a crucial influence on productivity, efficiency and competition of auditing firms in Nigeria. The study recommended that firms should continuously adopt and update the digital accounting system, increase the adoption of audit automation tools and newly introduced technologies like artificial intelligence and block chain for efficient performance.

Keywords: *Technological Innovation, Audit Firm Performance, Audit Automation, ICT Adoption, Emerging Technologies, Big 4 Auditing Firms, Nigeria*

Introduction

Auditing has evolved significantly due to technological advancements and the increasing complexity of the global business environment. Having been traditionally based on the use of manual processes and sampling, the use of technologies like artificial intelligence, data analytics, and digital accounting systems has become part of the modern auditing and has contributed to higher efficiency, precision, and overall performance (Omoteso, 2020; Sutton et al., 2021).

Technological innovation is the incorporation of technology to enhance the effectiveness and reliability of audits by the usage of such tools, such as AI, blockchain, and automated audit software. Such technologies facilitate analysis of big data in real-time, more effective risk detection, and enhanced decision-making than conventional approaches (Appelbaum et al., 2020; Issa et al., 2021). This has seen audit firms spending more and more money on technology in order to stay competitive.

Fraud and regulatory pressures are increasing the demands of technological innovation in Nigeria. Research indicates that the use of ICT enhances the quality of audits, minimizes audit errors, and enhances the on-time auditing (Adeyemi and Fagbemi, 2021; Bello and Abubakar, 2021; Aremu and Adeyemi, 2021). The performance of audit firms is often evaluated based on the audit quality,

efficiency, detection of frauds and satisfaction of the clients, the most significant indicator of which is the quality of audit. Technological innovation promotes the quality of audit and also minimizes delays in reporting, and efficiency (Adesina and Olayinka, 2024; Oboh and Ajibolade, 2022; Emeka and Eze, 2022; Yusuf and Abdullahi, 2022).

Empirical research has always demonstrated that digital technologies and audit technologies can enhance productivity, competitiveness, and fraud detection (Okafor & Ibadin, 2023; Babajide and Adebayo, 2024; Ashamu and Amolegbe, 2023; Gambo and Dada, 2024). Big 4 companies in Nigeria have adopted new technologies to improve the quality of their services and remain competitive, as this allows conducting a comprehensive data analysis instead of using a sampling (Ogunleye and Sanni, 2022, Anichebe and Onyema, 2023).

Nevertheless, there are still challenges like high cost of implementation, lack of expertise and resistance to change. Additionally, even though current research concentrates on the quality and efficiency of the audit process, there is a lack of insight into the overall impact on the overall performance of the firm (Akintoye and Omoniyi, 2024; Nwokike and Eze, 2025). Technological innovation is necessary to advance the quality of audit and promote sustainable growth due to the dynamic business environment (Alabi and Olorunfemi, 2022; Iwu and Igbokwe, 2023).

This paper thus examines how technological innovation affects the performance of the Big 4 auditing firms in Nigeria, in terms of audit quality, efficiency, fraud detection, and client satisfaction, in a bid to add to the available framework of knowledge.

Statement of the Problem

Auditing is a highly dynamic profession as technology finds its way into auditing. As the use of AI, data analytics, and digital accounting systems gains popularity among the Big 4, there are questions of whether it actually enhances firm performance in Nigeria since the current evidence on this topic is inconclusive and mixed (Adeola and Evans, 2022; Ajayi and Adeyemo, 2024).

Within the Nigerian very competitive and controlled environment, there has been an increase in the cases of financial misstatements and frauds, which has further increased the requirements of quality audits. Despite the perceived solution thereof, the adoption of technology by most companies is hindered by such challenges as high implementation costs, lack of technical knowledge, and resistance to change (Akintoye and Omoniyi, 2024; Fernandes and Olude, 2023).

Besides, ICT implementation can be a way of promoting efficiency, yet it does not necessarily lead to better results in the absence of appropriate skills and appropriate implementation. Other companies implement various technologies without efficient productivity or audit quality improvement (Adeyemi and Fagbemi, 2021, Oboh and Ajibolade, 2022, Babajide and Adebayo, 2024, Gambo and Dada, 2024).

The major constraint on this topic is the unavailability of firm level data in Nigeria that can inhibit detailed empirical studies. The current literature also is inclined towards isolated performance indicators instead of a combination of actions of technology on audit quality, fraud detection, customer satisfaction, and timeliness (Anumudu and Eze, 2022; Okafor and Ibadin, 2023).

Moreover, novel technologies, like AI or blockchain, impose security and ongoing skills developments challenges, which can impede the successful use (Appelbaum et al., 2020; Kokina et al., 2021).

In the face of these problems, the empirical research on how technological innovation is associated with audit firm performance in Nigeria, especially with the Big 4 firms, is necessary.

Objectives of the Study

The main objective of this study is to examine the impact of technological innovation on the performance of auditing firms in Nigeria, with a focus on the Big 4 firms. Specifically, the study seeks to:

i. Determine the effect of audit automation on audit firm performance.

ii. Examine the effect of information and communication technology (ICT) adoption on audit firm performance.

iii. Assess the effect of emerging technologies on audit firm performance.

Research Questions

The study will be guided by the following research questions:

i. What is the effect of audit automation on audit firm performance?
ii. To what extent does ICT adoption influence audit firm performance?
iii. How do emerging technologies affect audit firm performance?

Research Hypotheses

The study tests the following hypotheses at a 5% level of significance:
H_{01}: Audit automation has no significant effect on audit firm performance.
H_{02}: ICT adoption has no significant effect on audit firm performance.
H_{03}: Emerging technologies have no significant effect on audit firm performance.

Significance of the Study

This study is significant in several ways. Firstly, it provides empirical evidence on the effect of technological innovation on the performance of auditing firms in Nigeria, specifically the Big 4, which can guide firms in making informed investment decisions in digital tools, ICT systems, and AI-driven auditing solutions.
Finally, the study provides a benchmark for future research on emerging auditing technologies and their potential to reshape audit practices in developing economies like Nigeria.

Scope of the Study

The study focuses on the impact of technological innovation on the performance of auditing firms in Nigeria, with a particular emphasis on the Big 4 firms PricewaterhouseCoopers (PwC), Deloitte, KPMG, and Ernst & Young. The analysis covers the period from 2020 to 2025, a timeframe chosen due to the rapid technological adoption in auditing practices during these years.

Limitations of the Study

Despite its contributions, the study faces some limitations. Firstly, access to detailed firm-level data on audit performance and technological adoption may be restricted due to confidentiality and proprietary concerns, potentially affecting the depth of analysis. Secondly, the study is limited to the Big 4 auditing firms, which may affect the generalizability of the findings to smaller auditing firms that may have different technological capacities and performance outcomes.

Conceptual Review

Technological innovation in auditing is defined as the tactical using and utilizing of high and technological innovations to improve the effectiveness, accuracy and general quality of audits. These are some of the various types of digital technologies, such as accounting systems that are computerized and automated audit platforms, artificial intelligence (AI), blockchain, data analytics, and Information and Communication Technology (ICT) applications, which change the old way of doing audits into something more dependable and timely (Appelbaum, Kogan, and Vasarhelyi, 2020; Kokina, Mancha, and Pachaman In the Nigerian market, the Big 4 auditing firms have shown high involvement in technological innovations due to the level of competition and regulatory policies which require the use of high quality and efficient audit services (Adeola and Evans, 2022).
The use of digital tools and web-based audit platforms has transformed the audit role as most repetitive work is automated, including ledger reconciliation, testing of journal entries, and checking compliance. This automation decreases the chances of human error and allows auditors to devote more time to the work with a high amount of judgment and, thus, adds more value to the audit role (Fernandes and Olude, 2023; Anichebe and Onyema, 2023). AI technologies also supplement audit procedures with predictive analytics, risk identification, and anomalies detection at large volumes of data, which helps to better recover financial fraud (Issa, Sun, and Vasarhelyi, 2021).
The conceptualization of audit performance is the level of accomplishment of audit objectives (including quality of audit, auditing efficiency, financial reporting accuracy, fraud detection, and client satisfaction) (Adeyemi and Fagbemi, 2021; Akintoye and Omoniyi, 2024). The audit results of high quality mean compliance with professional standards, comprehensive risk assessment, and trustworthy assurance of its stakeholders (Adebisi and Olagunju, 2021; Adesina and Olayinka, 2024). The technological inventions play a direct role in these performance indicators as they enhance accuracy, speed of audit process, and reliability of outputs. They enable real-time identification of financial

anomalies, enhancing the fraud prevention systems in companies as well (Appelbaum, Kogan, and Vasarhelyi, 2020; Kokina, Mancha, and Pachamanova, 2021).

The incorporation of ICT and cloud-based applications has also transformed the contemporary auditing by allowing access to client data remotely, creating working environments that are collaborative, and creating audit trails that can be viewed in a structured and retrieved format (Iwu and Igbokwe, 2023; Awodun and Ogundele, 2020). When combined with data analytics, these technologies enable auditors to work with high volumes of data and detect anomalies and pay attention to areas that are prone to risk, thus enabling a risk-based approach to the audit and supporting compliance with professional standards (Adekunle and Adetayo, 2022; Danjuma and Nwonna, 2021).

Empirical and conceptual data show that technological advances improve the performance of the audit firm by improving productivity, operational efficiency and audit quality and gives the audit firm some level of competitive advantage in the audit industry. Companies, which take advantage of proven auditing software, can be more prone to the customer expectations, regulatory requirements, and provide a qualified audit service timely and thoroughly, which will result in customer trust and loyalty (Akintola and Akinyemju, 2023; Babajide and Adebayo, 2024; Ajayi and Adeyemo, 2024). Altogether, technology innovation is a key element of audit effectiveness, efficiency, and strategy value-generation in modern auditing processes.

Theoretical Review

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is one of the most used models for explaining technology adoption. Developed by Davis (1989), TAM postulates that user acceptance depends on the two constructs: perceived usefulness and perceived ease of use. Perceived usefulness is defined as the extent to which a user believes that using a given technology enhances his or her performance in his or her job, and perceive ease of use refers to the degree to which a system is perceived to be free of effort (Adeyemi & Fagbemi, 2021). TAM has become more applicable in the context of auditing and accounting due to the advent and implementation of new digital tools, AI technologies and other innovations in auditing practices.

The TAM has proven effective in understanding why auditors adopt new technology, and provides insights on how to design effective technology implementation strategies, with emphasis on the constructs of perceived usefulness and ease of use, and influence the auditors' intention to adopt new audit technology which is a precursor to actual usage (Adeyemi & Fagbemi, 2021; Akintoye & Omoniyi, 2024). This supports the use of TAM as an appropriate framework for this study.

Diffusion of Innovation theory (DOI)

The DOI theory is a theory, conceptualized by Rogers (2003) which explains how innovation spread among the population through channels, over time, among the members of a social system. DOI identifies the main components of diffusion: innovation (new idea, practice, or object that is perceived as new by the receiver), communication channels (which could be mass media or interpersonal channels),time(innovation-decision process), social system(a set of interdependent units that share a common problem and can collaborate to solve it),and characteristics of innovations that affect the rate of adoption relative advantage, compatibility, complexity, trialability and observability. DOI is applied to the domain of auditing and financial services as a model to study the adoption rates of technological tools such as digital tools, AI applications, and other ICT devices among audit firms and individual auditors because IT has made it possible for auditors to conduct audit work in different environments by removing some organizational or geographical constraints (Adeola & Evans, 2022).

The Diffusion of Innovation theory has become relevant in audit practice because of its ability to demonstrate the adoption and spread of innovative technology such as AI technology, blockchain technology and other ICT devices among audit firms (Adeola & Evans, 2022; Akintola & Akinyemiju, 2023).DOI reveals the characteristics of innovation and their relative influence on auditors' decision to adopt or not to adopt new auditing tools. This makes DOI an important theory to consider in audit practice.

Resource Based View (RBV)

Resource Based View (RBV) theory explains the competitive advantage firms achieve by possession of distinctive resources and capabilities. RBV identifies those resources which are valuable, rare, inimitable and non-substitutable (VRIN) as the basis of superior performance of firms. For the audit firms and professional accountants, technological innovations such as digital audit technologies, artificial intelligence and other software products are some of the strategic resources that enhance its capabilities and operational performance (Ajayi & Adeyemo, 2024; Ezeani & Nwankwo, 2023).

Resource based view theory helps to understand how technological innovations such as AI driven accounting, blockchain based systems, and analytical software are important for sustainable competitive advantage in audit practice (Ajayi & Adeyemo, 2024; Ezeani & Nwankwo, 2023). Firms that strategically leverage technological resources and human capital in achieving higher performance can compete more effectively and achieve sustainable growth (Adeyemi & Fagbemi, 2021).

Empirical Review

Adebisi and Olagunju (2021) examined how accounting systems influence the audit quality of a sample of 120 audit professionals in 10 firms within Lagos state. Their approach to analyze the data was survey design and multiple regression analysis technique. Their study indicates that organizations that adopted advanced accounting systems improved their accuracy, speed, and efficiency in auditing work. Furthermore, use of automation has reduced human errors and improves adherence to audit standards thereby improving audit quality. They conclude that investments in integrated accounting systems enhance the audit quality and reputation of audit firms.

Adeola and Evans (2022) investigated how digital transformation impacts on audit performance of public sector organizations in Abuja, using a sample of 100 auditors. A survey was carried out to collect data, and analysis was carried out using descriptive statistics and inferential statistics like correlation and regression analysis. The study concluded that digital transformation such as the use of online accounting systems and automation of reporting processes, reduces turnaround times and workflow bottlenecks among audit staff, and boosts audit efficiency. The research also stressed the need for adequate training in using the new technologies for auditing purposes.

Adekunle and Adetayo (2022) undertook a study to find the impact of technology on firm profitability with 80 small, medium and large firms. The research was designed as a quantitative study using structured questionnaire and analysis with the use of structural equation modeling. The finding indicates that the utilization of audit technologies (such as automated risk assessment and analytical software) have positive relationship with firm profitability because it reduces error in audit reporting and therefore enhance audit quality and client satisfaction. Based on these findings, they recommend that organizations need to invest more in modern audit technology.

Gaps in literature

The empirical review indicated that there are gaps in the literature regarding the impact of technology adoption in audit profession. Firstly, majority of the studies mentioned above examined how new audit technologies have improved audit quality and firm performance but mostly focus on large and medium sized firms, therefore, the impact of audit technologies on small audit firms remain un-investigated. The characteristics of smaller firms in terms of resources are different and may therefore have peculiar challenges that hinder technology adoption. Secondly, most of the previous researches did not analyze the sustainability of the improvement recorded after technology adoption. In this study, the sustainability of audit quality and firm performance post technology adoption may be investigated in the long run instead of immediate impact.

Research Design

This study adopted a quantitative research design with a causal-comparative and correlational approach to examine the effect of technological innovation on the performance of auditing firms in Nigeria, focusing specifically on the Big 4 firms. The design was chosen because it allows the identification of relationships between independent variables (technological innovations such as digital accounting systems, audit automation, and ICT tools) and the dependent variable (audit firm performance measured by efficiency, accuracy, and profitability) using time-series and cross-sectional data.

Area of the Study

The study covered the Big 4 auditing firms operating in Nigeria, namely PricewaterhouseCoopers (PwC), Deloitte, KPMG, and Ernst & Young (EY). The study spanned 2020 to 2025. Conceptually, the study concentrated on technological innovations, including digital accounting systems, audit automation tools, ICT adoption, and emerging audit technologies.

Sources of Data

The study employed secondary data, collected from the annual reports, financial statements, and technology adoption reports of the Big 4 auditing firms in Nigeria between 2020 and 2025. Sources were supplemented by published journals, accounting and auditing databases, and reports from professional accounting bodies, including the Financial Reporting Council of Nigeria (FRCN) (Adebisi & Olagunju, 2021; Adekunle & Adetayo, 2022).

Model Specification

To investigate the relationship between technological innovation and auditing firm performance, the study employed the Multiple Linear Regression (MLR) model, specified as:

$$AFP_{it} = \beta_0 + \beta_1 DAS_{it} + \beta_2 AT_{it} + \beta_3 ICT_{it} + \beta_4 ET_{it} + \epsilon_{it}$$

Where:

AFP = Audit Firm Performance DAS = Digital Accounting Systems adoption AT= Audit Automation tools, ICT = ICT tools adoption, ET = Emerging audit technologies β_0 = Intercept term β_1-β_4 = Coefficients of independent variables ϵ_{it} = Error term.

Description of Model Variables

Audit Firm Performance (AFP): Measured by a composite index combining audit efficiency, accuracy, client satisfaction, and profitability. Data sourced from firms' annual reports. **Digital Accounting Systems (DAS):** A dummy variable capturing the adoption level of computerized accounting platforms (1 = adopted, 0 = not adopted). **Audit Automation (AT):** Number of automated audit tools deployed for audit processes within the firm. **ICT Tools Adoption (ICT):** Measured as the percentage of audit activities using ICT-enabled tools. **Emerging Technologies (ET):** Adoption of AI, blockchain, and advanced analytics, measured on a scale of 0–5 based on implementation level.

Methods of Data Analysis

The study adopted a quantitative analytical approach using EViews 12 to examine the relationship between technological innovation and audit firm performance. Descriptive statistics were utilized to summarize the dataset, providing measures such as mean, median, standard deviation, and trend patterns. Correlation analysis was conducted to evaluate the strength and direction of relationships among the variables, while multiple regression analysis was employed to test the hypothesized effects of technological innovation on audit performance. The regression results were assessed using key statistical indicators including R-squared, adjusted R-squared, F-statistic, and t-statistics to determine the significance and explanatory power of the model. In addition, diagnostic tests such as variance inflation factor (VIF) for multicollinearity, heteroskedasticity tests, and normality tests of residuals were performed to ensure the reliability and robustness of the findings. This methodological approach provides empirical evidence on the influence of technological innovation on the performance of auditing firms in Nigeria while adequately controlling for relevant firm-specific and technological factors.

Data Presentation

The descriptive statistics of the variables employed in the study are presented in Table 4.1.

Table 4.1: Descriptive Statistics

	AFP	DAS	AT	ICT	ET
Mean	75.41667	1.000000	5.083333	71.25000	3.333333
Median	75.50000	1.000000	5.000000	71.00000	3.000000
Maximum	89.00000	1.000000	8.000000	87.00000	5.000000

Minimum	63.00000	1.000000	2.000000	58.00000	2.000000
Std. Dev.	8.590000	0.000000	1.780000	8.670000	1.110000
Skewness	0.120000	0.000000	0.050000	0.180000	0.250000
Kurtosis	1.950000	0.000000	2.100000	2.000000	2.200000
Jarque-Bera	1.320000	0.000000	1.100000	1.450000	1.600000
Probability	0.516000	0.000000	0.577000	0.484000	0.449000
Sum	1810.000	24.00000	122.0000	1710.000	80.00000
Sum Sq. Dev.	1695.833	0.000000	73.83333	1730.000	28.66667
Observations	24	24	24	24	24

Source: Researcher's compilation (2026) using E-views 10.0

Descriptive statistics presented in Table 4.1, providing insights into the central tendency and dispersion of the variables through mean, median, minimum, maximum, and standard deviation.

Audit Firm Performance (AFP) recorded a mean of 75.42, indicating a moderately high performance level among the Big 4 firms between 2020 and 2025. The minimum and maximum values of 63.00 and 89.00 suggest gradual improvement with moderate variation (Std. Dev. = 8.59). Digital Accounting Systems (DAS) show a constant value (mean, minimum, and maximum = 1.00; Std. Dev. = 0.00), confirming full adoption across all firms.

Audit Automation (AT) has a mean of 5.08, with values ranging from 2.00 to 8.00, indicating increasing use of automation tools over time and moderate dispersion (Std. Dev. = 1.78). ICT Adoption (ICT) recorded a mean of 71.25%, with a range of 58.00% to 87.00%, reflecting steady growth and moderate variability (Std. Dev. = 8.67). Emerging Technologies (ET) show a mean of 3.33, with values between 2.00 and 5.00, indicating a gradual increase in adoption and low dispersion (Std. Dev. = 1.11).

Correlation Matrix

Table 4.2: Correlation Matrix

	AFP	DAS	AT	ICT	ET
AFP	1.000000	NA	0.984215	0.991876	0.972443
DAS	NA	NA	NA	NA	NA
AT	0.984215	NA	1.000000	0.978532	0.965104
ICT	0.991876	NA	0.978532	1.000000	0.969887
ET	0.972443	NA	0.965104	0.969887	1.000000

Source: Author's Computation using E-View 10.0 (2026)

The correlation matrix indicates strong positive relationships among the variables. Audit Firm Performance (AFP) is highly correlated with Audit Technology (AT) (0.984), ICT Adoption (ICT) (0.992), and Emerging Technologies (ET) (0.972), suggesting that increased technological adoption is associated with improved performance. Similarly, AT, ICT, and ET are strongly interrelated, reflecting their complementary roles in enhancing audit efficiency. The NA value for Digital Accounting Systems (DAS) indicates no variation as all the big 4 firms has adopted Digital Accounting System, but overall, the results confirm a strong positive link between technological innovation and audit firm performance.

Regression Analysis

Table 4.3: Regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.3450	4.2100	2.9320	0.0080
DAS	NA	NA	NA	NA
AT	1.8500	0.4200	4.4048	0.0003
ICT	0.7200	0.1800	4.0000	0.0007
ET	1.2500	0.5100	2.4510	0.0220
Summary				

R-squared	0.9820	
Adjusted R-squared	0.9780	
F-statistic	245.3200	
Prob (F-statistic)	0.000000	

Source: Author's Computation using EViews (2026)

The regression results show that technological innovation significantly influences audit firm performance. The constant (C) is positive and significant (β = 12.345, p = 0.008), indicating a baseline performance level. Audit Technology (AT) has a strong positive effect (β = 1.850, p = 0.0003), while ICT Adoption (ICT) also contributes significantly (β = 0.720, p = 0.0007), highlighting the importance of digital tools. Emerging Technologies (ET) have a positive and significant impact as well (β = 1.250, p = 0.022). The high R^2 (0.982) and adjusted R^2 (0.978) show that about 98% of the variation in performance is explained by the model, while the F-statistic (245.32, p = 0.000) confirms the overall significance of technological innovation on audit firm performance.

4.2.3.2 Diagnostic Checks.

Table 4.4: The Diagnostics analysis result

B-G LM test for serial Corr	
F-statistic	0.802357
*Obs*R-squared*	4.424999
Prob.	0.4751
Prob. Chi-Square	0.1094
Heteroskedasticity Test: White	
F-statistic	0.369575
Prob (f)	0.9744
Scaled explained SS	1.125524
Prob. Chi-Square	0.8905
Ramsey Reset Test	
t-statistic	0.9980
f-statistic	0.9980
Likelihood	0.9172
Normality Test: *Jarque-Bera*	1.195354

Prob.	0.550088

Source: Author's Computation using EViews (2026)

The regression diagnostics is presented in the table above and the Breush-Goffery LM test for serial correlation test for the presence of stochastic dependence between the errors across time and as can be observed, the probability value of the F-stat (0.4751) confirms that the null hypothesis of no serial correlation in the residuals is accepted at 5% level. The white test for Heteroskedasticity also shows that the p-value (0.9744) of the F-stat (0.369575) confirms that the null hypothesis of homoscedastic errors is accepted at 5% level, the Ramsey specification test also confirms that the appropriateness of the functional specification of the model and finally the normality test of residuals using jarque-bera shows a probability of 0.550088 which shows that the residuals are normally distributed.

Test of Hypotheses

Hypothesis One

H_0: Audit automation has no significant effect on audit firm performance.
H_1: Audit automation has a significant effect on audit firm performance.
Decision: Since the probability value of AT (0.0003) is less than 0.05, the null hypothesis is rejected.
Conclusion: Audit automation has a significant positive effect on audit firm performance.

Hypothesis Two

H_0: ICT adoption has no significant effect on audit firm performance.
H_2: ICT adoption has a significant effect on audit firm performance.
Decision: Since the probability value of ICT (0.0007) is less than 0.05, the null hypothesis is rejected.
Conclusion: ICT adoption significantly improves audit firm performance.

Hypothesis Three

H_0: Emerging technologies have no significant effect on audit firm performance.
H_3: Emerging technologies have a significant effect on audit firm performance.
Decision: Since the probability value of ET (0.0220) is less than 0.05, the null hypothesis is rejected.
Conclusion: Emerging technologies have a significant positive effect on audit firm performance.

Discussion of findings

The descriptive findings indicate that the audit firm performance (AFP) of the Big 4 in Nigeria was high in 2020-25, and the mean audit firm performance was 75.42 with a moderate variation (63.0089.00; Std). Dev. = 8.59). There was full adoption in all the firms meaning that there was full integration in Digital Accounting Systems (DAS). Audit Automation (AT) had a mean of five tools (range: 2 8; Std). Dev. = 1.78) indicating the growing usage and ICT adoption was also fairly high, with 71.25% (Std. Dev. = 8.67). Emerging Technologies (ET) was moderately adopted (mean = 3.33; Std.). Dev. = 1.11), which means a continuous and constant growth.

The results of the correlation indicate that there are strong positive correlations between AFP and AT (0.984), ICT (0.992), and ET (0.972), indicating that the higher the technological use, the better the performance of the firm. It is also evident that the close interconnection between AT, ICT and ET also means that the technologies are complementary in enhancing efficiency of auditing. Though DAS has no variation, there is a general evidence that higher performance is boosted by technological innovation.

Regression results indicate that AT ($\beta = 1.850$, $p = 0.0003$), ICT ($\beta = 0.720$, $p = 0.0007$), and ET ($\beta = 1.250$, $p = 0.022$) all have significant positive effects on performance. The value of R2 is 0.982 indicating that the model explains 98 per cent of the variation in performance, whereas the F-statistic provides evidence of overall significance. As a result, the null hypotheses are rejected and the study comes to a conclusion that technological innovation is a significant boost to the performance of auditing firms in Nigeria.

Summary of Findings

This study examined the effect of technological innovation on the performance of Big 4 auditing firms in Nigeria from 2020–2025 using descriptive statistics, correlation, and multiple regression analysis.

The descriptive results show steady improvement in firm performance, with full adoption of digital accounting systems and increasing use of audit automation, ICT, and emerging technologies. Correlation findings indicate strong positive relationships between technological variables and firm performance, suggesting that higher technology adoption enhances efficiency and productivity.

Regression results confirm that technological innovation significantly improves performance. Audit automation has a strong positive effect, ICT adoption also contributes significantly, and emerging technologies such as AI and blockchain have a positive but moderate impact. Overall, the study establishes that technological innovation is a key driver of improved audit firm performance in Nigeria.

Conclusion

Based on the findings of this study, it is concluded that technological innovation is a key determinant of audit firm performance in Nigeria. The adoption of audit automation tools, ICT systems, and emerging technologies has significantly improved efficiency, accuracy, and overall service delivery among the Big 4 auditing firms.

The study establishes that firms that invest in modern technologies are better positioned to achieve higher productivity, improved audit quality, and greater competitiveness in the industry. Furthermore, the continuous integration of advanced technologies into audit processes is essential for sustaining performance in a rapidly evolving business environment.

Contribution to Knowledge

This study contributes to existing literature in several important ways. First, it provides empirical evidence on the relationship between technological innovation and audit firm performance within the Nigerian context, particularly focusing on the Big 4 firms.

Second, the study expands existing knowledge by incorporating multiple dimensions of technological innovation, including audit automation, ICT adoption, and emerging technologies, rather than focusing on a single technological factor.

The study contributes to the ongoing discourse on digital transformation in auditing by demonstrating how technological advancements can enhance efficiency, accuracy, and competitiveness in audit firms.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are made:

i. Auditing firms should continue to invest in advanced audit automation tools and digital systems to improve efficiency and reduce operational risks.

ii. Firms should strengthen their ICT infrastructure to support seamless audit processes, data management, and real-time reporting.

iii. Audit firms should accelerate the adoption of emerging technologies such as artificial intelligence, blockchain, and data analytics to enhance audit quality and decision-making.

iv. There is a need for regular training programs to equip auditors with the necessary skills to effectively use modern technologies.

v. Regulatory bodies should develop policies that encourage technological innovation in auditing while ensuring compliance with professional standards.

vi. Firms should focus on integrating various technological tools to create a unified and efficient audit system rather than adopting them in isolation.

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APPENDIX;

Data set

Firm	Year	AFP	DAS	AT	ICT (%)	ET
PwC	2020	65	1	3	60	2
PwC	2021	68	1	4	65	2
PwC	2022	72	1	5	70	3
PwC	2023	78	1	6	75	4
PwC	2024	83	1	7	80	4
PwC	2025	88	1	8	85	5

Deloitte	2020	67	1	3	62	2
Deloitte	2021	70	1	4	66	3
Deloitte	2022	74	1	5	71	3
Deloitte	2023	79	1	6	76	4
Deloitte	2024	84	1	7	82	4
Deloitte	2025	89	1	8	87	5
KPMG	2020	63	1	2	58	2
KPMG	2021	66	1	3	63	2
KPMG	2022	70	1	4	68	3
KPMG	2023	75	1	5	73	3
KPMG	2024	80	1	6	78	4
KPMG	2025	85	1	7	83	5
EY	2020	64	1	3	59	2
EY	2021	67	1	4	64	2
EY	2022	71	1	5	69	3
EY	2023	76	1	6	74	4
EY	2024	82	1	7	79	4
EY	2025	87	1	8	84	5