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The Role of Artificial Intelligence in Investment Management in Nigeria

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Abstract

The slow adoption of artificial intelligence (AI) in Nigeria's investment management sector continues to limit efficiency and data-driven decision-making. This study examined the role of AI in investment management in Nigeria, focusing on how ICT adoption, high technology intensity, and research and development (R&D) capacity influence its application. The study employed a quantitative research design using secondary data from the World Bank and Central Bank of Nigeria covering the period 2015–2024. Descriptive statistics, correlation analysis, diagnostic tests, and multiple regression analysis were conducted using STATA 26 to assess the relationships among the variables. The regression results revealed that ICT adoption ($\beta = 0.328$, $p = 0.001$), high technology intensity ($\beta = 0.294$, $p = 0.002$), and R&D capacity ($\beta = 0.217$, $p = 0.011$) all had positive and significant effects on the application of AI in investment management, with an overall R^2 value of 0.712, indicating strong explanatory power. The study concluded that enhanced ICT infrastructure, technological advancement, and R&D investments significantly improve the adoption and effectiveness of AI in Nigeria's investment management sector. It recommended that financial institutions strengthen their digital infrastructure, embrace emerging technologies, and increase funding for innovation to achieve sustainable investment performance and competitiveness.

Keywords: Artificial Intelligence, ICT Adoption, High Technology Intensity, Research and Development Capacity, Investment Management, Nigeria.

Introduction

Investment management is undergoing a fundamental transformation globally as asset managers increasingly turn to artificial intelligence (AI) tools to enhance decision-making, optimise portfolios, and manage risk. Recent studies show that machine learning, predictive analytics and algorithmic trading platforms enable faster response to market shifts and more refined forecasting of asset returns (Nair, 2024). This evolution has broadened the domain of investment strategy: rather than purely human judgement and historical heuristics, firms are leveraging vast data reservoirs and computational techniques to deliver more agile and tailored portfolio solutions. As competition intensifies in the asset management industry, the promise of AI is not only greater returns but also improved operational efficiency and robustness to market shocks.

Globally the shift to AI-driven investment management is also driven by the convergence of high-frequency data, cloud computing infrastructure and advanced analytics ecosystems. Researchers argue that the maturation of these digital technologies underpins a new generation of investment models characterised by dynamic adaptation and real-time learning (Guo, Wang, Ni & Shum, 2022). In such environments, investment firms that adopt AI capabilities can gain a competitive edge by identifying patterns and opportunities that evade traditional methods. At the same time, concerns around data quality, model interpretability and regulatory oversight are emerging as key constraints (Wang & Yu, 2021). In short, the global landscape of investment management is increasingly defined by how effectively firms integrate AI into their operations.

Moving to emerging economies, the potential for AI in investment management is even more pronounced given the room for leap-frogging legacy infrastructure and the opportunity to embed digital-first practices. In many developing countries, investment markets are less saturated, institutional frameworks are evolving, and data infrastructure remains a work in progress. This makes the integration of AI not only an operational innovation but a structural opportunity to reshape how capital is allocated, risk is priced and portfolios are managed. Yet the gap between advanced and emerging markets remains substantial, suggesting that the benefits of AI may accrue unevenly across countries.

In the context of Nigeria, Africa's largest economy, the relationship of digital transformation and financial services is gaining traction. Studies highlight that Nigeria is expanding its digital economy, with rising internet usage and mobile penetration setting the stage for more sophisticated digital finance applications (Ogunbodede & Atchrim, 2024). In the financial sector specifically, banks and fintech firms are increasingly experimenting with AI-enabled services, from credit-scoring algorithms to robo-advisors and risk-monitoring systems. But despite this momentum, investment management in Nigeria remains relatively under-penetrated by AI compared with advanced economies. The challenge lies not only in adopting AI but doing so in a manner aligned with local market structures, regulatory constraints and

data ecosystems.

A critical question for Nigeria then is how the underlying enabling factors for AI adoption in investment management are evolving. In other words, what conditions must be in place for investment firms in Nigeria to effectively leverage AI? Three broad enablers seem especially relevant: first, the extent of ICT adoption (i.e., the infrastructure and connectivity that supports digital finance); second, high-technology intensity (the capacity of the economy to produce or utilise advanced tech and export high-tech goods); and third, research and development capacity (the innovation ecosystem and human-capital base required to develop or apply AI). In Nigeria, each of these enablers exhibits variable performance: for instance, internet and mobile penetration have grown, but there remain challenges in broadband infrastructure and digital skills (Odusanya & Adetutu, 2020). Similarly, the country's share of high-technology exports remains small (TheGlobalEconomy, 2025), and R&D expenditure as a percentage of GDP is low (Quadri, 2023).

These enablers matter because investment management powered by AI does not rest solely on buying a software licence: it depends on the digital backbone (ICT adoption), the broader technological milieu (high technology intensity) and the human and institutional capacity to innovate (R&D capacity). If any of these are weak, the pathway to AI-driven investment management becomes constrained. In many markets, firms adopting AI face delays, cost increases or sub-optimal outcomes when infrastructure or skills are lacking. In Nigeria, early evidence suggests that while financial institutions are keen to experiment (e.g., AI-driven credit scoring), the broader investment management segment remains cautious, citing data gaps, regulatory uncertainty and talent shortages (Nnaaka & Nwachukwu, 2025).

Despite the promise of AI for investment management in Nigeria, there is a practical problem: measurement and empirical evidence of how these enablers actually influence AI adoption and investment performance remain scarce. Specifically, we lack systematic studies linking levels of ICT adoption, high-technology intensity and R&D capacity to the extent of AI deployment in investment management (e.g., in portfolio allocation, risk modelling or fintech advisory services) and ultimately to investment outcomes. This gap limits the ability of policymakers and firms to prioritise which enablers to strengthen and how to sequence interventions.

Therefore, this research aims to address the following problem: In the Nigerian context, to what extent do variations in ICT adoption, high-technology intensity and research and development capacity explain the uptake and effectiveness of artificial intelligence in investment management? By empirically investigating how these three enabling factors drive AI-enabled investment management, we seek to provide clearer guidance to investment firms, policymakers and technology developers on where to focus their efforts for maximum impact. Against this backdrop, the study tests the following hypothesis:

H_{01}: ICT Adoption has no significant effect on the application of Artificial Intelligence in Investment Management in Nigeria.

H_{02}: High Technology Intensity has no significant effect on the application of Artificial Intelligence in Investment Management in Nigeria.
H_{03}: Research and Development Capacity has no significant effect on the application of Artificial Intelligence in Investment Management in Nigeria.

Literature Review

Concept of Investment Management

Investment management, as conventionally understood, refers to the process of making decisions about asset allocation, portfolio construction, risk and return trade-offs and the governance of investment portfolios on behalf of clients or institutions. Recent research highlights that this domain is being transformed through the adoption of artificial intelligence (AI) techniques which enable more dynamic asset-allocation models, continuous monitoring, and deeper data-driven insight (Anuar, Sulaiman & Mohamad, 2025). For instance, the comparative analysis of AI-driven versus human-managed equity funds found that AI-driven funds out-perform in down-trend markets by mitigating downside risk and achieving superior risk-adjusted returns (Anuar, Sulaiman & Mohamad, 2025). Other studies point to how machine-learning frameworks reshape portfolio optimisation by adapting to evolving market conditions and moving beyond traditional mean-variance frameworks (Bi & Lian, 2024). In the asset-management space, AI systems are also applied to forecasting, sentiment analysis and automated trading execution — thus broadening the conception of "investment management" from human judgement plus financial models to a hybrid of human-machine collaboration (Liu, 2023). A systematic review of AI in investment funds emphasises that AI's impact spans front-end (robo-advisors, investor profiling) and back-end (automated trading, predictive modelling) tasks in investment management practice (Mertzanis, 2024). Moreover, empirical evidence shows that portfolios managed using AI methods such as random forests, support vector machines or deep networks achieved higher Sharpe ratios and lower volatility in comparison to traditional strategies (e.g., in cybersecurity stock portfolios using AI) (Liu, 2023; Anuar et al., 2025). Collectively this literature suggests that investment management in the AI era means not just selecting assets, but designing and executing investment processes that integrate data ingestion, algorithmic decision-rules, risk monitoring and performance feedback loops. For the purposes of this study, investment management will thus be conceptualised as the effectiveness with which investment portfolios are constructed, monitored and adjusted using artificial intelligence technologies, including portfolio optimisation, risk-adjusted performance and decision automation. This conceptualisation emphasises both the outcome dimension (performance, returns, risk) and the process dimension (AI tools, data models, algorithmic decision-making) of investment management.

Concept of ICT Adoption

ICT adoption has become a major determinant of how financial institutions leverage technology to enhance efficiency and innovation. According to Ayim, Kassahun, Addison,

and others (2022), the degree to which firms adopt ICT tools determines their ability to integrate advanced systems such as artificial intelligence into investment management operations. In financial markets, ICT adoption facilitates quick information dissemination, reduces operational costs, and improves data-driven decision-making processes (Igwilo & Sibindi, 2021). Studies in developing economies have found that ICT infrastructure, particularly broadband connectivity, internet penetration, and mobile usage, enhances financial inclusion and market performance (Ayim et al., 2022). The availability of reliable ICT systems also improves data storage and analytics capacity, which is critical for AI-based investment strategies. Igwilo and Sibindi (2021) observed that economies with strong ICT frameworks record better adaptability to emerging digital finance tools and risk management technologies. By supporting automation, real-time communication, and data analysis, ICT adoption helps investment firms in emerging markets optimize asset allocation and monitor market risks efficiently. For this study, ICT Adoption is conceptualised as the extent to which digital infrastructure (internet penetration, broadband access, and mobile connectivity) and technological utilisation support the integration of artificial intelligence into investment management activities in Nigeria's financial sector.

Concept of High Technology Intensity

High technology intensity refers to the degree to which an economy or firm produces and exports goods that require high levels of research and development, advanced manufacturing, and technological sophistication. According to the World Bank, high-technology exports consist of products with significant R&D intensity such as aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery. Empirical evidence from OECD economies shows that countries with higher levels of high-technology exports tend to have stronger innovation ecosystems, better growth performance, and deeper absorptive capacity for emerging technologies (Zapata, Arrazola, & Hevia, 2023). In developing economies like Nigeria, the share of high-technology exports has remained comparatively low, suggesting a weak technological base for supporting advanced innovations such as artificial intelligence in financial systems. This limitation indicates that local firms may face challenges in leveraging high-tech infrastructure for algorithmic trading, data analytics, and AI-driven investment decision-making. Yasin and Sari (2022) found that economies classified as "high technology" record higher productivity and competitiveness due to their capacity to integrate automation and machine learning into production and management processes. Within investment management, high technology intensity provides the structural foundation for innovation, digital transformation, and AI integration. It facilitates the use of advanced computing systems, robotics, and data-processing tools that improve investment analysis, risk management, and financial forecasting. In this study, High Technology Intensity is conceptualised as the degree to which the Nigerian economy demonstrates the capability to produce and export high-R&D-intensity technological goods and services such as electronics,

computers, and scientific instruments, reflecting a technological base conducive to deploying artificial intelligence in investment management.

Concept of Research and Development Capacity

Research and Development (R&D) capacity represents a country's ability to generate, absorb, and apply scientific and technological knowledge for innovation and economic growth. It encompasses the intensity of investments in research activities, the quality of research institutions, and the number of researchers involved in advancing new technologies. In the context of financial systems, strong R&D capacity enables the adaptation of complex innovations such as artificial intelligence and machine learning into investment decision-making processes. According to Afzal and Law (2021), countries with sustained R&D investments experience higher levels of technological advancement, innovation diffusion, and firm competitiveness. Similarly, Egbetokun, Adeniyi, and Siyanbola (2020) observed that R&D expenditure drives industrial innovation and productivity growth across African economies, enhancing the capacity of firms to adopt advanced digital tools.

In developing economies like Nigeria, R&D capacity remains relatively low, with limited institutional funding, weak university–industry collaboration, and poor technology transfer mechanisms (Afolabi & Oladipo, 2022). This structural limitation restricts the local development of AI applications in financial markets and undermines domestic innovation in investment analytics. Nchake and Shawa (2023) noted that sustained investment in R&D infrastructure is vital for fostering technology-driven sectors, as it enhances data analysis, algorithmic modelling, and predictive financial systems. Moreover, R&D efforts create the foundation for knowledge spillovers, which are critical in building domestic capabilities for financial innovation. In investment management, a robust R&D environment supports the development of intelligent forecasting systems, enhances data security, and facilitates more efficient portfolio management strategies driven by AI. In this study, Research and Development Capacity is conceptualised as the level of investment, institutional support, and human expertise dedicated to advancing scientific and technological innovation that enables the integration of artificial intelligence into investment management practices in Nigeria's financial sector.

Review of Related Empirical Studies

ICT Adoption and Investment Management

Investment management's shift toward AI is increasingly linked to the level of ICT adoption, because digital infrastructure determines data availability, processing speed and platform reach that AI systems require. Recent empirical and review studies find that AI and machine learning improve portfolio selection, forecasting accuracy and risk control in practice, especially when fed by rich, timely data streams (Sutienė, Simanavičienė & Raudeliūnienė, 2024; Wang, 2024). Foundational reviews argue that AI methods produce more robust out-of-sample portfolio weights and enhance return-risk tradeoffs compared with classical techniques

(Bartram, Branke & Motahari, 2020; Meng, 2024). Bibliometric and sectoral studies show that broader fintech adoption and digital finance expansion create the user base and transactional data that enable AI applications in asset management (Pattnaik, 2023; Huarng, 2022). Pandemic-era research documents accelerated digital finance uptake, which in many markets increased demand for algorithmic and robo-advice solutions (Fu, 2022). Studies focused on African markets report that electronic trading platforms and improved ICT penetration raise stock market participation and create conditions for algorithmic trading to scale (Manasseh, 2025; ICT penetration analyses, 2024). Country specific work on Nigeria similarly links digital finance indicators to stock market growth, although liquidity effects are mixed, highlighting data and infrastructure gaps that could blunt AI's benefits (digital finance and stock market performance in Nigeria, 2024). Collectively these studies suggest that stronger ICT adoption supports more effective AI driven investment management by improving data quality, market access and scalability of algorithmic tools.

High Technology Intensity and Investment Management

High technology intensity has increasingly been recognised as a key enabler of innovation and efficiency in investment management. Economies with strong technological bases tend to adopt advanced analytical tools, automation, and artificial intelligence more readily in financial decision-making (Zapata, Arrazola, & Hevia, 2023). Empirical research across OECD and emerging economies reveals that high-technology exports correlate with improved innovation capacity, which in turn enhances financial market sophistication and portfolio efficiency (Yasin & Sari, 2022; Aghion, Bergeaud, & Van Reenen, 2021). Studies by Phiri (2023) and Zhao and Wang (2024) found that firms operating in technology-intensive sectors achieve better investment diversification and risk control due to their reliance on data-driven decision systems. Similarly, Nchake and Shawa (2023) reported that countries with higher technological intensity attract more foreign portfolio investments, as investors perceive such economies as digitally resilient and adaptive. In the context of emerging economies, Oluwatobi and Akinwale (2021) observed that limited technological capacity hinders financial innovation, leading to lower productivity and weaker returns on investment portfolios. Collectively, these findings indicate that high technology intensity improves investment management performance by fostering innovation, predictive analytics, and automation capabilities that optimise risk–return trade-offs.

Research and Development Capacity and Investment Management

Empirical evidence consistently highlights research and development (R&D) capacity as a major driver of innovation and improved investment outcomes. Economies that invest heavily in R&D create environments where technological learning, data analytics, and AI integration thrive, ultimately enhancing investment management efficiency (Afzal & Law, 2021). Studies have shown that higher R&D expenditure stimulates innovation, leading to better investment diversification and portfolio performance (Afolabi & Oladipo, 2022; Nchake & Shawa, 2023).

In emerging economies, R&D intensity enhances firms' absorptive capacity, enabling them to adopt advanced digital and analytical tools critical for investment forecasting and risk management (Egbetokun, Adeniyi, & Siyanbola, 2020). Okafor and Nwokoye (2024) found that R&D-driven financial institutions in Africa achieve superior returns due to improved technological adaptation and algorithmic processing capabilities. Similarly, Kanga and Mensah (2023) observed that R&D investment facilitates innovation spillovers that support AI adoption in portfolio optimisation. Furthermore, Zhang and Lee (2025) revealed that institutional R&D spending significantly predicts the resilience of investment portfolios during periods of market volatility. Together, these studies affirm that R&D capacity is fundamental to AI-driven investment management, fostering innovation, analytical accuracy, and sustainable financial performance.

While previous studies provide important information on how AI, ICT adoption, and technological innovation influence investment management, much of the existing literature exhibits methodological and contextual limitations that this study seeks to address. For instance, Bartram, Branke, and Motahari (2020) and Wang (2024) highlight AI's potential to improve portfolio optimization, yet their analyses are largely centered on developed economies with mature data infrastructure, limiting applicability to emerging markets like Nigeria. Conversely, African-focused works (Manasseh, 2025; Oluwatobi & Akinwale, 2021) acknowledge the transformative role of ICT and technology intensity but often overlook the institutional and regulatory barriers that shape AI integration in investment decision-making. Moreover, while Afzal and Law (2021) and Afolabi and Oladipo (2022) establish a strong link between R&D capacity and innovation outcomes, they provide little empirical evidence on how such investments translate into financial performance or AI adoption at the firm level. This study therefore extends the literature by integrating the fragmented information on a unified analytical framework that empirically tests how ICT adoption, high-technology intensity, and R&D capacity jointly drive AI adoption in Nigeria's investment management sector. Unlike prior descriptive works, it emphasizes causal interactions among these enablers and evaluates their combined effects using panel data from 2015–2024, providing a more contextualized understanding of AI-driven investment efficiency in a developing economy setting.

Theoretical Framework

The Technology Acceptance Model (TAM), proposed by Davis (1989), provides the most relevant theoretical foundation for examining the role of artificial intelligence (AI) in investment management in Nigeria. The model explains how users come to accept and use new technologies based on two key factors: perceived usefulness and perceived ease of use. In the context of investment management, these constructs reflect how financial institutions and investment professionals perceive AI tools, ICT systems, and data-driven technologies in improving portfolio decisions, forecasting accuracy, and risk control. The theory assumes that individuals adopt technology when they believe it enhances their job performance and when

it is easy to operate within existing workflows. This theory is strongly linked to the present study because AI-driven investment management relies heavily on ICT adoption, technological intensity, and R&D capacity, all of which influence users' perceptions of technology's value and usability. Empirical applications of TAM by researchers such as Mariani and Borghi (2021) and Sutienė, Simanavičienė, and Raudeliūnienė (2024) found that technology acceptance significantly predicts AI adoption in finance and investment settings. Therefore, TAM underpins this study by providing a behavioral and organizational explanation of how Nigerian investment firms' willingness to integrate AI depends on their digital infrastructure, innovation intensity, and technological capability.

Methodology

The study adopted an ex post facto research design, which was considered most suitable for examining the effect of artificial intelligence (AI) adoption on investment management performance, since it relied on existing secondary data rather than manipulating variables. The population of the study comprised all listed financial and investment firms in Nigeria, totaling 54 firms as recorded by the Nigerian Exchange Group (NGX) between 2015 and 2024. Using the Yamane (1967) sample size determination formula, a representative sample of 30 firms was selected through purposive sampling to include those with active AI or ICT-driven investment operations. Out of the 54 listed financial and investment firms in Nigeria, a total of 30 were selected using purposive sampling to ensure representation of entities actively engaged in AI-driven or ICT-enabled investment operations. The inclusion criteria required firms to (i) have publicly available annual reports between 2015 and 2024, (ii) demonstrate consistent use of digital or ICT-based financial tools, and (iii) operate within the investment, asset management, or financial services subsectors. Firms were excluded if they (i) lacked reliable financial data across the study period, (ii) were inactive or delisted during the sample window, or (iii) operated solely as holding companies without direct investment management activities. This approach ensured that the sample captured firms with meaningful technological and operational engagement relevant to the study's objectives, enhancing the validity and generalizability of the findings.

Data were obtained from annual reports, the Central Bank of Nigeria Statistical Bulletin, and World Development Indicators. Descriptive statistics such as mean, standard deviation, and skewness were used to summarize the data. The correlation matrix was employed to identify relationships among variables and to check for multicollinearity. Diagnostic tests, including normality, heteroskedasticity, serial correlation, and the Hausman test, were conducted to ensure the robustness of the model and to determine whether a fixed or random effects regression was appropriate. Finally, panel regression analysis was applied to estimate the impact of AI adoption, ICT intensity, and R&D expenditure on investment performance, yielding reliable and valid results consistent with prior financial econometric studies.

Model Specification

The study employed a panel regression model to evaluate the effect of Artificial Intelligence (AI) on investment management performance in Nigeria. The model incorporated ICT Adoption, High Technology Intensity, and Research and Development Capacity as the independent variables, while investment performance was the dependent variable. Control variables such as firm size and leverage were included to enhance the model's explanatory power. The functional and econometric forms of the model were specified as follows:

Functional Form: **INVEST = f(ICTA, HTI, RDC, FS, LEV)**

Econometric Model: $\mathbf{INVEST_{it} = \beta_0 + \beta_1 ICTA_{it} + \beta_2 HTI_{it} + \beta_3 RDC_{it} + \beta_4 FS_{it} + \beta_5 LEV_{it} + \mu_{it}}$

Where:

$INVEST_{it}$ = Investment Management Performance of firm i at time t

$ICTA_{it}$ = ICT Adoption of firm i at time t

HTI_{it} = High Technology Intensity of firm i at time t

RDC_{it} = Research and Development Capacity of firm i at time t

FS_{it} = Firm Size (control variable)

LEV_{it} = Leverage (control variable)

μ_{it} = Error term capturing unobserved factors

The model was estimated using panel data regression techniques with both fixed and random effects specifications, and the Hausman test was applied to determine the most appropriate model for interpretation.

Variable Measurement

Table 1.

Variable Measurement Table

Variable	Measurement	Proxy / Indicator	Source
Investment Management Performance (DV)	Return on Assets (ROA)	Profitability ratio	Adebayo & Olayinka (2022)
ICT Adoption	ICT expenditure as % of total investment	Technology investment ratio	Olowe (2023)
High Technology Intensity	Share of high-tech industries in GDP	Technological intensity index	World Bank (2024)
Research and Development Capacity	R&D expenditure as % of GDP	Innovation index	OECD (2023)
Firm Size (Control)	Natural log of total assets	Firm size index	Afolabi (2021)
Leverage (Control)	Total debt to equity ratio	Financial risk indicator	Agyemang (2022)

Source: Author's Compilation, 2025.

Results/Findings

This section presents the results of the empirical analysis conducted to examine the impact of Artificial Intelligence (AI) adoption on investment management in Nigeria. The findings are based on descriptive statistics, correlation analysis, diagnostic tests, and regression results derived from STATA 26 outputs.

Table 2.

Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
Investment Performance	7.41	1.28	4.12	9.65
ICT Adoption	5.87	1.11	3.02	7.92
High Technology Intensity	4.96	0.93	2.75	6.58
Research and Development Capacity	3.84	0.71	2.10	5.11
Firm Size	8.12	1.25	5.40	10.22
Leverage	0.62	0.19	0.28	0.90

Source: STATA 26 Output, 2025.

The descriptive statistics indicate that the mean value of investment performance was 7.41, suggesting that most firms recorded a moderate profitability level. ICT adoption and technology intensity also showed significant dispersion, implying variations in firms' digital infrastructure and innovation investment. The standard deviations indicate minimal data volatility, while the minimum and maximum values demonstrate the spread across Nigerian firms.

Table 3.

Correlation Matrix

Variable	INVEST	ICTA	HTI	RDC	FS	LEV
INVEST	1.000	0.612	0.548	0.501	0.472	-0.329
ICTA	0.612	1.000	0.582	0.503	0.391	-0.276
HTI	0.548	0.582	1.000	0.534	0.365	-0.241
RDC	0.501	0.503	0.534	1.000	0.332	-0.216
FS	0.472	0.391	0.365	0.332	1.000	-0.410
LEV	-0.329	-0.276	-0.241	-0.216	-0.410	1.000

Source: STATA 26 Output, 2025.

The correlation results show that all independent variables had positive associations with investment performance, with ICT adoption ($r = 0.612$) exhibiting the strongest correlation. The moderate correlations suggest that the variables contribute meaningfully without excessive multicollinearity, which supports the suitability of the data for regression analysis.

Table 4.
Diagnostic Test Results

Test	Statistic	Decision
Normality (Jarque-Bera)	4.27 (p=0.118)	Data normally distributed
Heteroskedasticity (Breusch-Pagan)	7.54 (p=0.136)	No heteroskedasticity
Serial Correlation (Wooldridge)	1.89 (p=0.211)	No serial correlation
Hausman Test	18.36 (p=0.027)	Fixed effects model preferred

Source: STATA 26 Output, 2025.

Diagnostic test outcomes confirmed that the data satisfied regression assumptions. The Hausman test result justified the use of the fixed effects model, ensuring consistency and unbiasedness of the estimates.

Table 5.
Regression Results

Variable	Coefficient	Std. Error	t-Statistic	P-Value
ICT Adoption (ICTA)	0.328	0.092	3.56	0.001
High Technology Intensity (HTI)	0.294	0.088	3.34	0.002
R&D Capacity (RDC)	0.217	0.084	2.58	0.011
Firm Size (FS)	0.103	0.051	2.02	0.045
Leverage (LEV)	-0.142	0.069	-2.06	0.041
Constant	3.784	0.566	6.69	0.000

$R^2 = 0.712$ | Adjusted $R^2 = 0.681$ | F-Statistic = 23.54 (p = 0.000)

Source: STATA 26 Output, 2025.

The regression results reveal that ICT adoption, high technology intensity, and research and development capacity significantly influenced investment management performance. The positive coefficients indicate that increases in technological and innovation inputs led to improved firm performance. The R^2 value of 0.712 implies that 71.2% of variations in investment performance were explained by the model's variables, confirming strong explanatory power.

Discussion of Findings

The study examined how ICT adoption, high technology intensity, and research and development (R&D) capacity affected the application of artificial intelligence (AI) in investment management in Nigeria. The regression results revealed an R^2 of 0.712 and an adjusted R^2 of 0.681, indicating that approximately 71.2% of the variation in AI application within investment management was explained by the independent variables. While the findings of this study align with prior research emphasizing the positive roles of ICT adoption, technological intensity, and R&D capacity in driving AI integration (Adebayo & Olayinka, 2022; Kumar & Rajan, 2022; Tang & Zhao, 2024), some contrasting evidence exists in the

literature. For instance, Meng (2024) and Bartram, Branke, and Motahari (2020) caution that AI adoption may not always lead to superior investment outcomes when data quality and model governance are weak, a concern particularly relevant in emerging markets like Nigeria, where infrastructural gaps persist. Similarly, studies such as Nnaaka and Nwachukwu (2025) and Odusanya and Adetutu (2020) highlight that institutional barriers, regulatory uncertainty, and limited digital literacy can moderate or even dampen the performance benefits of AI-driven financial systems. By juxtaposing these perspectives, this study provides a more detailed interpretation: while technological and innovation factors significantly enhance investment management performance, their impact is conditional on the strength of Nigeria's digital ecosystem, regulatory readiness, and human-capital base. Hence, policy and industry strategies should focus not only on technology acquisition but also on institutional capacity building to ensure sustainable AI-driven investment outcomes. The overall F-statistic of 23.54 ($p = 0.000$) confirmed the joint significance of the model, showing that the predictors collectively influenced AI-driven investment management outcomes.

H_{01}: ICT Adoption has no significant effect on the application of Artificial Intelligence in Investment Management in Nigeria.

The coefficient for ICT adoption was 0.328 with a p-value of 0.001, indicating a strong positive and statistically significant effect. This led to the rejection of the null hypothesis. The result implies that firms with advanced ICT infrastructure are more capable of integrating AI tools for portfolio analysis, asset allocation, and risk management. This finding aligns with Al-Ghamdi (2023) and Adebayo (2022), who found that ICT infrastructure enhances operational efficiency and data-driven investment decision-making in financial institutions. It also supports the Technology Acceptance Model (TAM), which emphasizes that perceived usefulness and accessibility of technology influence its adoption. Hence, investment firms in Nigeria that embrace digital transformation are better positioned to benefit from AI applications.

H_{02}: High Technology Intensity has no significant effect on the application of Artificial Intelligence in Investment Management in Nigeria.

High technology intensity recorded a coefficient of 0.294 with a p-value of 0.002, showing a significant positive impact. The null hypothesis was therefore rejected. This suggests that firms with greater integration of advanced technologies, such as automation, data analytics, and cloud-based systems, are more likely to adopt AI for strategic investment decisions. The result supports Kumar and Rajan (2022), who observed that technology-intensive environments encourage digital innovation and AI deployment in emerging economies. It also aligns with Schumpeter's Innovation Theory, which argues that technological progress drives new investment opportunities and enhances productivity. In the Nigerian context, increased technology intensity improves AI readiness and facilitates smarter investment operations.

H_{03}: Research and Development Capacity has no significant effect on the application of Artificial Intelligence in Investment Management in Nigeria.

The coefficient for R&D capacity was 0.217 with a p-value of 0.011, indicating a positive and significant effect. Thus, the null hypothesis was rejected. This finding implies that higher R&D spending and stronger innovation capabilities significantly improve firms' ability to apply AI in investment management. The result corroborates Tang and Zhao (2024), who found that R&D-driven innovation enhances AI integration in financial sectors across developing markets. It also supports the Endogenous Growth Theory, which emphasizes knowledge creation and innovation as critical to technological advancement. Therefore, firms that invest in R&D are more likely to develop customized AI solutions for forecasting, risk assessment, and performance monitoring. Additionally, firm size ($p = 0.045$) showed a modest positive effect, suggesting that larger firms have the financial and structural capacity to absorb new technologies. Leverage ($p = 0.041$), however, exhibited a negative effect, implying that highly leveraged firms may be constrained by debt obligations that limit investment in digital transformation.

Conclusion

The study concluded that ICT adoption, high technology intensity, and R&D capacity significantly enhance the application of AI in investment management in Nigeria. The findings reveal that firms with modern ICT systems, robust technology integration, and strong R&D foundations achieve better efficiency and data-driven investment performance. These outcomes reaffirm that technological advancement and innovation are key drivers of competitive advantage in the evolving investment management environment.

Recommendations

i. Investment management firms should prioritize upgrading their ICT infrastructure and digital security frameworks to facilitate AI integration and improve data analytics capabilities.
ii. Financial institutions should invest more in emerging technologies such as machine learning, blockchain, and predictive analytics to strengthen their technological base and optimize decision-making.
iii. Both government and private sector actors should increase funding for research and development through grants, innovation hubs, and partnerships with academic institutions to build local AI expertise relevant to the investment sector.

Limitations of the Study

The study relied on secondary data, which might not capture firm-specific attitudes or operational barriers affecting AI adoption. Moreover, macro-level indicators used in the analysis may not fully represent micro-level technological differences among firms.

Suggestions for Further Studies

Future research could use firm-level panel data to analyze how managerial competence, digital literacy, and regulatory frameworks moderate the relationship between technological adoption and AI integration. Comparative studies between Nigeria and other African economies could also deepen understanding of how institutional quality influences AI-driven investment management.

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