

ARTIFICIAL INTELLIGENCE ADOPTION AND FINANCIAL EFFICIENCY IN DEPOSIT MONEY BANKS

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Abstract

This study explored the influence of the adoption of Artificial Intelligence on financial outcomes of deposit money banks between 2017 and 2023. It adopted *ex-post facto* research design in the study. A sample size of eight (8) banks was purposively selected from among twenty-four (24) deposit money banks. Secondary data were gathered from the selected sample. Analysis of the panel data revealed average values of 19%, 33.73%, 6.08%, and 25.52% for cost reduction, profitability, return on assets and revenue growth respectively, across the deposit money banks. There were strong positive correlations among investment in artificial intelligence and all the dependent variables of financial performance. The regression analysis showed that artificial intelligence investments contributed significantly to cost reduction, with coefficient of 1.089 at $p < .01$; profitability, with a coefficient of 1.156 at $p < .01$; return on assets, with a coefficient of .527 at $p < .01$; and revenue growth, with a coefficient of 1.089 at $p < .01$. The study concluded that the adoption of artificial intelligence by deposit money banks enhances and transforms their operational efficiency. It therefore recommends that Nigerian deposit money banks should prioritize investments in artificial intelligence infrastructure. Banks should also leverage artificial intelligence to diversify revenue streams and enhance customer personalization.

Key words: Artificial intelligence, cost reduction, profitability, return on assets, revenue growth.

JEL Classification: G21, O33, C23, M15

1.0 Introduction

The global financial services industry is rapidly undergoing a profound transformation, this transformation is powered by rapid technological advancement, particularly when artificial intelligence (AI) and related digital innovations are introduced into operations of firms. According to Maseke (2024), financial services industry adopts advanced technologies such as artificial intelligence (AI), machine learning (ML) algorithms, predictive analytics, chatbots and robotic process automation (RPA) to enhance their operations that will meet demands of customers and improve their operations. This shows firms are drifting away from the usual manual, paper-based processes to embracing automated systems powered by advanced technologies (Johora et al., 2024).

The Nigerian banking sector particularly Deposit Money Banks (DMBs) has increasingly embraced AI technologies across their critical operational areas to respond to competitive pressures and changing customer demands. These include credit risk assessment, customer service automation, transaction monitoring, and financial forecasting, all of which have demonstrated potential to improve performance outcomes.

Recent studies by Salemcity et al., (2023) and Bello and Olufemi, (2024) suggest that Nigerian DMBs are incorporating AI applications into their various operations so that they can remain competitive in a globalized financial environment. This growing adoption highlights how strategic is AI as a tool for enhancing efficiency, innovation, and long-term sustainability within

the banking industry. Despite the increasing adoption of AI technologies in Nigerian Deposit Money Banks, there has not been empirical evidence on whether these investments translate into improved financial efficiency outcomes.

While AI is widely recognized for its potential to streamline operations, reduce costs, and enhance decision-making, its actual impact on key financial indicators such as cost efficiency, revenue growth, profitability, and return on assets in the Nigerian context is not clearly established (Lawal & Williams, 2023). This creates a knowledge gap that needs to be explored. Banks may be allocating substantial financial resources toward AI's adoption without having sufficient evidence that the technology will improve their financial efficiency outcomes. This study therefore seeks to investigate if there is any relationship between AI-driven initiatives and crucial financial indicators in Nigerian deposit money banks. Addressing this problem will be essential to guide strategic investment decisions, improve operational performance, and enhance the overall competitiveness of the Nigerian banking industry in the global financial landscape if well explored.

2.0 Literature Review

According to Dergaa et al. (2023) artificial is something developed by humans rather than occurring naturally, while intelligence refers to mental activities like reasoning, learning, and understanding (Enholm et al., 2022). Corroborating this, Latif et al. (2023) explain that AI involves developing robots or systems that simulate human intelligence. This simulation helps the machine to analyze data, recognize patterns, adapt to new information, and make informed decisions with limited human intervention. It also helps to process large volumes of structured and unstructured data in real time. Selfridge and Simon in Wamba-Taguimdje et al. (2020) described it as computer applications that simulate intelligent behavior with minimal human intervention. By implication, AI refers to the simulation of human intelligence using machines and software. When components of AI such as deep learning, machine learning, chatbots, neural networks, and virtual assistants are applied to business, they transform business processes and enhance customer satisfaction, cut operational costs, and improve organizational.

Machine Learning

As machine learning (ML) is a subset of AI, it trains algorithms to recognize patterns and make useful data-driven decisions (Boppana, 2022). It plays a key role in tasks where explicit programming is impractical, such as fraud detection, by identifying unusual behaviors and alerting security teams (Kuznetsov et al, 2024). Nalini et al., 2024; Okeleke et al., 2024) hint on the practicability of ML in transforming the financial sector, especially deposit money banks, by analyzing vast datasets, identifying patterns, and forecasting trends. These analytic capabilities and real-time fraud detection enable banks to tailor services to individual needs based on their spending habits and risk profiles (Ramya et al., 2024).

Chatbot

Chatbots are examples of AI in banking that are replacing the front-desk scenes at the banks (Kaur & Tanwar, 2024). They play a crucial role in enhancing customer service and operational efficiency (Wang et al., 2022). Singh et al. (2025) maintains that one of their primary advantages is their ability to provide 24 hours daily support, which is invaluable for both customers and banks. This round-the-clock availability ensures that customers can get assistance whenever they

need it, even outside of traditional banking hours. As a result, banks can improve their customer service without the need for constant human supervision.

Deep learning (DL)

Deep learning (DL) is an advanced type of machine learning that consists of multiple artificial neural network layers, providing high-level abstracts for data modelling (Taherdoost, 2023). This claim was supported by Janiesch et al. (2021) who explained that DL is a class of machine learning techniques that employs neural networks with many layers, hence the term “deep”. This shows that it is designed to model and understand complex patterns in data by building and training multi-layered neural networks. In the banking sector, deep learning has several impactful applications, which include analyzing transaction patterns and identifying anomalies that may indicate fraudulent activities (Bello et al., 2023). It also helps in assessing credit risk (Scott et al., 2024) by analyzing various factors such as transaction history, payment behavior, and external data. This implies that DL improves the accuracy of credit scoring and decision-making processes when duly integrated into a system.

Artificial Intelligence and Cost Reduction

Literature has often conceptualized AI as the capability of machines to simulate human intelligence in learning, reasoning, and decision-making processes (Enholm et al., 2022; Dergaa et al., 2023). Beyond these conceptual foundations, findings from several studies reveal that AI technologies enable organizations to process large volumes of structured and unstructured data in real time, thereby enhancing analytical capacity and operational decision-making of the technologies (Wamba-Taguimdje et al., 2020). This shows the convergence of thoughts on AI applications as widely recognized programs that can transform core operations. They improvements in organizational outcomes, such as enhanced customer satisfaction, increased efficiency, and better overall performance (Elegunde & Oladimeji, 2020; Salemcity et al., 2023).

AI applications are widely recognized, in the banking sector, for their ability to transform core operations. Machine learning can help to strengthen fraud detection and predictive analytics. Deep learning improves complex data analysis and credit risk assessment. While chatbot technologies enhance customer service through continuous, it also ensures real-time engagement (Wang et al., 2022; Kuznetsov et al., 2024; Scott et al., 2024). Despite these variations across studies, a dominant role that AI plays are its ability to ensure cost efficiency through automation and process optimization (Selvarajan, 2024; Abuzaid, 2024). While these findings establish a strong general link between AI adoption and cost reduction across industries, there remains limited empirical synthesis within the specific context of deposit money banks, particularly in emerging economies such as Nigeria. This suggests that although the cost-reduction potential of AI is well acknowledged, its contextualized impact in banking environments is still underexplored. Based on this premise, the following hypothesis is proposed:

H₀₁: Artificial intelligence adoption has no significant effect on cost reduction in deposit money banks in Nigeria.

Artificial Intelligence and Revenue Growth

Literature consistently identifies revenue growth as a critical indicator of a firm's financial health, reflecting its capacity to expand operations, attract new customers, and deepen relationships with existing ones (Potwora et al., 2023). It is commonly measured as the percentage change in revenue over time, providing insight into the effectiveness of business strategies and market positioning (Covrig et al., 2021). Within the banking sector, revenue growth is influenced by a complex interplay of operational efficiency, customer engagement, and technological innovation (Ogbuji & Lawal, 2024).

A growing body of literature has highlighted that AI significantly drives revenue growth by enhancing service delivery, enabling data-driven decision-making, and improving customer experience. Specifically, the application of AI such as predictive analytics, personalized banking services, and automated customer interactions is widely being adopted and recognized because of the ability it has to create new revenue streams and improve customer retention (Gyau et al., 2024; Sodeinde et al., 2024). However, there are challenges that are of great concern regarding the adoption of AI. This includes implementation challenges, ethical considerations, and potential risks that may influence the effectiveness of AI in driving revenue outcomes (Paleti, 2024). Meanwhile, several studies emphasize the transformative potential of AI as a catalyst for revenue growth and customer satisfaction, some suggest that its impact is not automatic but depends on how effectively banks manage the complexities in their adoption (Amaduche & Okarfor, 2024). More importantly, empirical evidence on the extent to which AI adoption translates into measurable revenue growth within DMBs in emerging economies such as Nigeria still very limited. This indicates a contextual gap in literature, warranting further investigation. Based on this premise, the study hypothesizes as follows:

H₀₂: Artificial intelligence adoption has no significant effect on revenue growth of deposit money banks in Nigeria.

Artificial Intelligence and Profitability

Profitability represents a fundamental measure of a firm's financial performance, capturing its ability to generate returns after accounting for operational costs and risks (Olayinka, 2022). It is widely regarded not only as an indicator of short-term financial success but also as a reflection of long-term sustainability and value creation (Kuo et al., 2023). Within DMBs, profitability majorly influences the efficiency of income generation and cost management, with key indicators such as net interest margin which reflect how effectively financial resources are utilized (Alzoubi & Salem, 2022; Natufe & Evbayiro-Osagie, 2023). Recent studies emphasize the growing role that AI is playing in profitability outcomes in the banking sector. Evidence suggests that AI improves financial performance by enhancing operational efficiency, improving customer engagement, and strengthening risk management processes of the firm that adopts it (Egbuhuzor et al., 2025).

Specifically, AI-driven systems enable faster and more accurate decision-making. It improves loan approvals, accelerates fraud detection, and enhance credit risk assessment. This reduces operational costs and enhances service delivery (Ikudabo & Kumar, 2024). Additionally, the ability of AI to analyze large datasets supports optimized pricing strategies and personalized financial services, creating new revenue opportunities and strengthening competitive advantage

(Ashta & Herrmann, 2021). Despite these insights, limited empirical attention has been given to how AI adoption translates into measurable profitability gains within deposit money banks in emerging economies such as Nigeria, thereby revealing a contextual gap that warrants further investigation. Based on this premise, the study hypothesizes as follows:

H₀₃: Artificial intelligence adoption has no significant effect on profitability of deposit money banks in Nigeria.

Artificial Intelligence and Return on Asset (ROA)

Return on Assets (ROA) has strategic consequences for management. It is a key indicator of how a firm utilizes its assets to generate profit efficiently. This makes it a critical means of measuring managerial effectiveness and operational performance of a firm (Akinleye & Dadebo, 2019). A higher ROA suggests efficient asset utilization and sound management practices. Meanwhile, when ROA declines it signals operational inefficiencies, poor investment decisions, or financial distress, including reduced cash flows and weakened profitability (Hou et al., 2025). By implication, ROA provides stakeholders with valuable insights into a firm's financial health, although its interpretation often requires consideration of industry-specific dynamics and structural differences across firms.

Emerging evidence suggests that AI has influence on ROA. Salemcity et al. (2025) explained that by AI enhances asset utilization and improves operational efficiency within organizations, particularly in the banking sector. Through data-driven decision-making, process automation, and improved risk management, AI can optimize the deployment of financial and non-financial assets, thereby improving returns generated from existing resources. Theoretically, there are linkages between AI adoption and improved asset efficiency, empirical evidence—especially within deposit money banks in emerging economies—remains limited. This highlights a contextual gap of knowing whether AI adoption significantly translates into improved ROA performance. Based on this premise, the following hypothesis is proposed:

H₀₄: There is no significant relationship between artificial intelligence adoption and return on asset of deposit money banks in Nigeria.

Theoretical Framework

Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al. (2003) propounded the unified theory of acceptance and use of technology (UTAUT) on which this study is anchored. The theory addresses the issue of adoption of innovations and the eventual performance expectancy from the usage of such innovations. UTAUT is rooted in theories of user (individuals and organizations) intentions to use information system and their subsequent usage behavior operationally and financially. The process of adoption of innovation starts with identifying system characteristics and capabilities, and the motivations needed to use the innovation, which is variables to measure their use and then actual usage (Ahmad et al., 2023). By applying UTAUT, the study logically connects AI adoption drivers to actual financial outcomes in DMBs. It provides a comprehensive framework to explore why some banks benefit more from AI than others; how organizational and individual factors shape AI, and what performance indicators (like ROI, operational efficiency, and customer service) are most influenced by AI technologies.

Empirical Reviews

Adeyemo and Okoronkwo (2024) examined the effect of AI on the operational efficiency of deposit money banks in Lagos State, Nigeria. Survey research design was adopted, and 450 copies of the questionnaire were administered to regular employees selected randomly from the five banks. The study concluded that AI significantly contributes to the operational efficiency and fraud detection in deposit money banks in Nigeria to improve their efficiency. Alekseeva et al. (2024) investigated the association between AI adoption and corporate performance. The researchers created a model to investigate the link between AI and corporate performance, as assessed by firm growth, investment decisions, and productivity. The study discovered a strong correlation between AI adoption and overall investment. The study also found a strong link between AI use and corporate growth. Salemcity et al. (2023) in their research looked at the impact of AI on personnel costs and other operating costs in the Nigerian banking industry. The study evaluated secondary data collected between 2012 and 2022 from the DMBs' respective financial statements using a panel regression model. The study indicated that DMBs in Nigeria would benefit from the implementation of AI in their corporate running activities.

Okoliko et al. (2023) examined the impact of AI on the performance of chosen deposit money banks in Abuja, Nigeria. The researcher used a cross-sectional descriptive study approach, with a structured questionnaire prepared specifically for this purpose. The study's findings revealed that the use of AI improves efficiency, effectiveness, and productivity. It also increases customer happiness, and the overall performance of the selected DMB institutions in Abuja. Ekpa et al. (2023) in his study evaluated the effect of artificial brainpower on corporate performance of listed deposits money banks in Nigeria. The study employed *ex-post facto* and longitudinal research design. The findings revealed that automated chat bots have a positive and significant effect on the Return on Assets (corporate performance) of Nigerian quoted deposit money banks, whereas deep learning machines have a negative but statistically significant effect on Return on Assets. Ajayi and Akinrinola (2023) on AI and the internal audit quality of commercial banks in Nigeria investigated the application of AI in Nigerian commercial banks in a bid to facilitate audit quality. This study adopted the survey research design with the use of purposive sampling methods. The study recommended increased AI awareness, training, and driving automation to improve audit quality in commercial banks. However, it is apparent from the above reviews that there is a notably very few of empirical studies that rigorously quantify the financial impact of AI technologies on DMBs in Nigeria.

3.0 Methodology

This study employed *ex-post facto* research design. Secondary data were gathered from the financial statements of the sample and the Nigerian Exchange Group from 2017 to 2023. A sample size of eight (8) DMBs that have all the relevant data was purposively selected out of fourteen (14) Nigerian DMBs. The models adopted for the study were specified as;

$$CR_{it} = \alpha + \beta_1 AI_{it} + \epsilon_{it} \tag{1}$$

$$PF_{it} = \alpha + \beta_1 AI_{it} + \epsilon_{it} \tag{2}$$

$$ROA_{it} = \alpha + \beta_1 AI_{it} + \epsilon_{it} \tag{3}$$

$$RG_{it} = \alpha + \beta_1 AI_{it} + \epsilon_{it} \tag{4}$$

Where: (i = 1, 2,.. n) (t = 1, 2, ... t)

AI = AI Software and Hardware Capitalization, CR = Cost reduction; PF = Profitability, RG = Revenue Growth, ROA = Return on Asset, n = Number of companies or cross-section, t = Number of time period, α = intercept, β_1 = Coefficient of regression and ϵ_i = Error term

AI was measured as the ratio of software and IT assets to total assets. CR was calculated as operating expenses divided by total revenue. PF was measured as net profit divided by total equity. RG was measured as the percentage change in total revenue from one period to the next, while ROA was calculated as profit after tax divided by total assets.

4.0 Results and Discussion

Descriptive Statistics

Table 1 offers valuable insights into the descriptive statistics of financial performance and AI-related investments of Nigerian Deposit Money Banks (DMBs), focusing on cost reduction, profitability, return on assets (ROA), revenue growth, and AI software and hardware capitalization. The mean cost reduction was 19.07%, indicating that AI adoption led to a 19% average decrease in operational costs. The median of 17.25% and a standard deviation of 8.85% suggest variability in AI's cost-saving effectiveness across banks. Cost reduction ranged from 6.5% to a maximum of 42.1%, showing that while some banks achieved substantial savings, others experienced minimal reductions.

Profitability has a mean of 33.73% with a standard deviation of 12.38%, reflecting a strong financial performance across the banks following AI adoption. The median profitability of 31.95% is relatively close to the mean, suggesting a balanced distribution of profit levels among the banks. The maximum-recorded profitability is 61.9%, while the minimum is 13.9%, indicating a wide range of profitability outcomes and illustrating that while some banks have significantly benefited from AI, others are still struggling to achieve comparable profitability gains.

The mean ROA for the sampled banks is 6.08%, indicating that, on average, banks are generating a 6% return on their assets after AI adoption. The median ROA is 5.45%, slightly lower than the mean, suggesting that more banks have ROA figures below the average. The maximum ROA of 16.5% suggests that some banks have been highly efficient in converting their assets into profits, while the minimum ROA of 2.1% indicates that some banks face challenges in achieving significant returns.

Revenue growth has a mean value of 25.52%, showing that, on average, banks experienced a revenue increase of about 25% after adopting AI technologies. The median revenue growth is 22.65%, indicating that the majority of banks have experienced below-average growth rates, with a maximum of 62.2% and a minimum of 8.5%. This wide range highlights significant disparities in the impact of AI on revenue growth across different banks. The standard deviation of 12.69% suggests a moderate to high level of variability in revenue growth outcomes.

AI software and hardware capitalization, representing the banks' investment in AI technologies, has a mean value of ₦17.85 billion. The median capitalization is ₦13.5 billion, indicating that half of the banks invested less than this amount in AI-related infrastructure. The maximum investment recorded is ₦69.2 billion, showing that some banks made significant financial

commitments to AI, while the minimum is just ₦1.9 billion, indicating that some banks have not heavily invested in AI. The standard deviation of ₦14.50 billion, however, points to considerable disparity in AI investments.

Table 1:
Descriptive Statistics

	Cost Reduction (%)	Profitability (%)	Return on Assets (ROA) (%)	Revenue Growth (%)	AI Software and Hardware (₦ billion)
Mean	19.07321	33.73214	6.082143	25.52143	17.84643
Median	17.25000	31.95000	5.450000	22.65000	13.50000
Maximum	42.10000	61.90000	16.50000	62.20000	69.20000
Minimum	6.500000	13.90000	2.100000	8.500000	1.900000
Std. Dev.	8.847095	12.38216	3.085692	12.68509	14.50100
Skewness	0.591414	0.390910	1.205663	0.818814	1.452530
Kurtosis	2.511755	2.185498	4.498082	3.076161	4.986440
Jarque-Bera	3.820755	2.974193	18.80372	6.271123	28.89906
Probability	0.148025	0.226028	0.000083	0.043475	0.000001
Sum	1068.100	1889.000	340.6000	1429.200	999.4000
Sum Sq. Dev.	4304.910	8432.482	523.6821	8850.134	11565.34
Observations	56	56	56	56	56

Source: Researchers' Computation (2025).

Test of Variables

Correlation Analysis

Table 2 below revealed that AI software and hardware capitalization show a strong correlation with cost reduction ($r = 0.810$, $p < 0.01$), profitability ($r = 0.801$, $p < 0.01$), ROA ($r = 0.801$, $p < 0.01$) and revenue growth ($r = 0.777$, $p < 0.01$). This suggests that AI technologies enhance financial performances of DMBs.

Table 2:
Correlation Statistics

	AI Software and Hardware Capitalization	Cost Reduction (%)	Profitability Net Profit (%)	Return on Assets (ROA) (%)	Revenue Growth (%)
AI Software and Hardware Capitalization	1				
Cost Reduction (%)	.810**	1			
Profitability Net Profit (%)	.801**	.990**	1		
Return on Assets (ROA) (%)	.820**	.954**	.939**	1	
Revenue Growth (%)	.777**	.992**	.977**	.972**	1

Source: Researchers' Computation (2025).

Regression Analysis and Hypothesis Testing

The study sought to know the effect of AI adoption on the financial outcomes of DMBs in Nigeria. This necessitates the regression results as shown below for each of the objectives of the study.

Objective 1: The effect of artificial intelligence adoption on cost reduction of deposit money banks in Nigeria

The regression analysis presented in Table 3a below with correlation coefficient (R) of 0.834 indicates a strong positive relationship between the AI technologies and Cost Reduction. The R-Square value of 0.696 and the F-statistic of 60.608 in Table 3b reveal that approximately 69.6% of the variation in cost reduction is explained by the influence of AI technologies adoption in the operation of Nigerian DMBs, while the F-statistic, indicates that the regression model provides a significantly better fit to the data compared to a model with no predictors at p-value less than 0.05.

Table 3a:
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.834 ^a	.696	.684	4.9709	1.043

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Cost Reduction (%)

Table 3b:
ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2995.267	2	1497.633	60.608	.000 ^a
	Residual	1309.643	53	24.710		
	Total	4304.910	55			

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Cost Reduction (%)

Table 3c:
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.744	1.077		9.049	.000
	AI Software and Hardware Capitalization	1.089	.229	1.786	4.752	.000

Table 3c:
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.744	1.077		9.049	.000
	AI Software and Hardware Capitalization	1.089	.229	1.786	4.752	.000

a. Dependent Variable: Cost Reduction (%)

Objective 2: The effect of artificial intelligence adoption on profitability of deposit money banks

The regression analysis presented in Table 4a below with correlation coefficient (R) of 0.809 indicates a strong positive relationship between AI Software and Hardware Capitalization and Profitability of Deposit Money Banks. The R-Square value of 0.655 and the F-statistic of 50.346 in Table 4b reveal that approximately 65.5% of the variation in profitability is explained by the influence of AI technologies on Nigerian DMBs, while the F-statistic indicates that the regression model provides a significantly better fit to the data compared to a model with no predictors at p-value less than 0.05.

Table 4a:
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.809 ^a	.655	.642	7.4072	1.010

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Profitability Net Profit (%)

Table 4b:
ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5524.569	2	2762.285	50.346	.000 ^a
	Residual	2907.913	53	54.866		
	Total	8432.482	55			

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Profitability Net Profit (%)

Table 4c:
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	21.112	1.604		13.159	.000
	AI Software and Hardware Capitalization	1.156	.342	1.354	3.385	.001

a. Dependent Variable: Profitability Net Profit (%)

Objective 3: The relationship between artificial intelligence adoption and return on assets of deposit money bank in Nigeria

The regression analysis as shown in Table 5a to 5c examines how AI Software and Hardware Capitalization affect the Return on Assets (ROA) of Nigerian Deposit Money Banks. Results show a strong model fit ($R = 0.889$, $R^2 = 0.790$), indicating that 79% of the variation in ROA is explained by the two predictors. AI investment has a positive and significant impact on ROA, increasing asset efficiency. Overall, the model is statistically significant and robust, underscoring the short-term profitability benefits of AI adoption in banking.

Table 5a:
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.889 ^a	.790	.782	1.4420	1.030

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Return on Assets (ROA) (%)

Table 5b:
ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	413.471	2	206.735	99.418	.000 ^a
	Residual	110.212	53	2.079		
	Total	523.682	55			

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Return on Assets (ROA) (%)

Table 5c:
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.662	.312		8.522	.000
	AI Software and Hardware Capitalization	.527	.067	2.478	7.930	.000

a. Dependent Variable: Return on Assets (ROA) (%)

Objective 4: The effect of artificial intelligence adoption on the revenue growth in deposit money banks in Nigeria

The regression analysis examines how AI Software and Hardware Capitalization affect the Revenue Growth (%) of Nigerian Deposit Money Banks. Results show a strong model fit ($R = 0.827$, $R^2 = 0.684$), indicating that 68.4% of the variation in revenue growth is explained by the predictor. AI investment has a positive and significant impact on revenue growth, boosting banks' ability to scale operations and increase income. Overall, the model is statistically significant and reliable, highlighting the immediate revenue-enhancing potential of AI adoption in the banking sector.

Table 6a:
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.827 ^a	.684	.672	7.2613	1.011

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Revenue Growth (%)

Table 6b:
ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6055.611	2	3027.806	57.424	.000 ^a
	Residual	2794.523	53	52.727		
	Total	8850.134	55			

a. Predictors: (Constant), AI Software and Hardware Capitalization

b. Dependent Variable: Revenue Growth (%)

Table 6c:
Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	12.352	1.573		7.853	.000
AI Software and Hardware Capitalization	1.890	.335	2.161	5.644	.000

a. Dependent Variable: Revenue Growth (%)

The results are in line with the findings of Ekpa et al. (2023) which revealed that automated chat bots have a significant and positive effect on corporate performance. The result also corroborates the findings of Salemcity et al. (2023), which revealed that AI adoption positively influences financial performance of DMBs while Ajayi and Akinrinlola (2023) showed that AI adoption has its own challenges in DMBs especially when applying it to auditing. Adeyemo and Okoronkwo (2024) also gave their own opinion, supporting the outcome of this study, that AI enhances operational efficiency and fraud detection in deposit money banks in Nigeria.

5.0 Conclusion and Recommendations

This study, while contributing meaningful empirical evidence on the relationship between AI adoption and financial efficiency in Nigerian deposit money banks, is subject to several limitations that should be acknowledged. The study sourced data from purposively selected eight DMBs out of twenty-four banks for a period of seven years. This can limit the generalizability of the findings. Future studies should expand the scope. Secondly, AI investment was proxied through AI software and hardware capitalization. This may not fully capture investment in AI. Banks may capitalize it differently while some might have been expensed. Future research may develop more robust indices that will capture all AI applications separately for easy measurement. Thirdly, this study only focused on financial efficiency neglecting non-financial aspects such as customer satisfaction, service quality, cyber risk exposure, or regulatory compliance costs. These non-financial outcomes may interact with financial performance in complex ways. Future research should adopt a balanced scorecard approach to assess the impact of AI across both financial and non-financial dimensions. Fourthly, cross-bank variability of AI's impact on financial performance was observed in this study suggesting the need to include moderating factors. Future studies should test for the effect of bank size, ownership structure (public versus private), management quality, and digital infrastructure readiness, which may condition the AI-performance relationship differently across institutions. The study is also limited to Nigeria alone; it can be expanded to West Africa or even Sub-Saharan Africa.

This study examined the impact of artificial intelligence adoption on the financial efficiency of Nigerian deposit money banks from 2017 to 2023. It focused on cost reduction, profitability, return on assets, and revenue growth. Panel regression analysis of eight purposively selected DMBs revealed that AI adoption significantly and positively influenced all four financial performance indicators. The study therefore concludes that AI adoption is an economically meaningful driver to drive financial efficiency in Nigerian deposit money banks.

Based on these findings, Nigerian DMBs are recommended to prioritize AI investment as a core strategic commitment rather than a secondary technological upgrade. All banks should also invest in employee training, AI governance, and model oversight to ensure that infrastructure investments translate into sustainable performance gains. They should also institute quarterly performance monitoring systems that track AI-linked financial metrics. This will help boards to take timely action that can improve financial efficiency of Nigerian banks. At the policy level, the Central Bank of Nigeria should establish a clear regulatory framework governing AI deployment in banking, including adoption guidelines, and incentive schemes to support smaller institutions in accessing AI capabilities.

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