



IMPACT OF AI-STRUCTURED INVESTMENT ON DEPOSIT MONEY BANKS FINANCIAL PERFORMANCE OF IN NIGERIA

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Abstract: The adoption of Artificial Intelligence (AI) in the financial industry has significantly influenced the investment behavior and efficiency of banking institutions. This research work empirically examines the impacts of AI-structured investment on the financial performance of Deposit Money Banks in Nigeria. The research work adopted the ex-post facto research design, and the data collected from the annual financial statements of the selected DMBs used for the study covers the period from 2015 to 2024. Software book value, software expenses, and AI-driven customer interface chatbots were used as proxies for AI-structured investment, while return on equity was used to measure financial performance in the study. The findings of the study revealed that both software book value and the AI-driven customer interface chatbot have a significant positive relationship with return on equity. The study also revealed that software expenses have a significant negative relationship with return on equity. The researcher concludes that the AI-investment structured investment significantly influences the financial performance of deposit money banks in Nigeria.

Keywords: AI-Structured Investment, AI-Software Book value (AISBV), AI-Software Expenses (AISEXP), AI-driven Customer Interfaces ChatBots (AIDCICBs), ROE

1.1 Background to the Study

Artificial intelligence breakthroughs have significantly brought a technical revolution to the global banking industry. Financial institutions are increasingly adopting AI-based systems for algorithmic trading, risk assessment, fraud detection, credit scoring, automating customer service, and portfolio management. According to Jabin, Akhand, & Siddique (2023), the application of these technologies in improving investment products and portfolios includes the use of artificial intelligence technologies such as machine learning, big data analytics, and prediction algorithms in creating, managing, and optimizing investment products and portfolios, otherwise referred to as AI-structured investment. These investments rely on the help of AI systems for evaluating the vast amounts of financial data and non-financial data, identifying trends, assessing risks, and making investment

decisions with little human aid. AI-structured investment is a purposeful and systematic investment of funds for the development and utilization of AI technology for the improvement of efficiency and decision-making. Only limited empirical data exists on how AI investments affect the financial performance of businesses, although the use of AI in Nigerian banks has been on the increase. This paper seeks to address this deficiency by providing empirical evidence on how AI-structured investments affect the financial performance of DMBs in Nigeria.

1.2 Statement of the Problem

The Nigerian DMBs are faced with the challenges of declining profit margins, a higher percentage of non-performing credit, inefficient business practices, and increased competition from fintech organizations. While the AI technology presents the benefits of increased

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productivity and more profitable business operations for any company, the huge cost of introducing AI implies an inquiry into whether the benefits shall be duly reaped. AI Structured Investment has attracted little attention in the earlier studies concerning the investment in technology and the financial performance of banks in Nigeria. Most of these studies focused on the fintech revolution and electronic banking in Nigeria (Adewumi, Melikam, & Ige, 2023; Raymond, Ebenezer, Kehinde, & Lateef, 2022). Bank managers and lawmakers are in a state of dilemma concerning the financial pay-off of the AI investment. To redress the problem, this study examines whether AI Structured Investment affects the financial performance of Nigerian DMBs significantly.

1.3 Objectives of the Study

The main objective of this study is to examine Impact of AI-structured investment on Deposit Money Banks financial performance of in Nigeria. The specific objectives are:

- i. To examine the impact of AI software book value on DMBs financial performance in Nigeria with respect to return on equity (ROE).
- ii. To determine relationship between AI-software expenses and DMBs financial performance in Nigeria with respect to return on equity (ROE).
- iii. To determine the effect of AI-driven customer interfaces-chatbots on DMBs financial performance in Nigeria with respect to return on equity (ROE).

1.4 Hypotheses

H₀₁: There is no significant relationship between AI software book value and deposit money banks financial performance in Nigeria with respect return on equity (ROE).

H₀₂: There is no significant relationship between AI-software expenses and DMBs financial performance in Nigeria with respect to return on equity (ROE).

H₀₃: There is no significant relationship between AI-driven customer interfaces-chatbots and deposit money banks financial performance in Nigeria with respect return on equity (ROE).

2. Related review of literature

The field of research dedicated to the development of computer systems with the capability of performing activities that are otherwise carried out by humans is referred to as artificial intelligence, or AI. It involves fields that include robotic process automation, machine learning, and natural language processing. It has transformed from being an important aspect of the future-thinking banks to being an additional feature of the industry today. Resources aimed at improving the quality of interaction with clients, to the extent that they are dedicated to the capitalization of the above activities, define the concept of AI-structured investment. "Algorithmic structuring," in which AI operates on massive data sets on the intentions of the clients, market tendencies, and risks developing the optimal structures of financial products, is the core concept of this field of research. These structured products often include derivatives and traditional investment products, allowing leveraged investment in the IT sector or capital protection. The structural shift of Nigerian banks is demonstrated by the progression from "internet banking," which makes the job of transactions easier, to "AI-enabled banking," which predicts the needs of the clients and adjusts the risks dynamically (Adeniyi & Williams, 2023). Financial performance is one complex concept that is usually evaluated using criteria that involve both accounting and the market. Return on Assets (ROA) shows how well a finance manager manages money and represents how well the bank applies all its assets to generate net revenue. The investors in the Nigerian Exchange Group place very important emphasis on return on equity (ROE), representing information on the returns made for the shareholders in association with the book value of their investment. While non-interest income increasingly represents revenues emanating from digital and electronic banking services, NIM is a measure of how efficiently the core banking function is operating, as it relates to the spread between interest earned on loans and deposits. These factors are shaped by a unique set of macroeconomic and bank-specific factors, which apply to a banking context in Nigeria. Although factors such as



interest rates, inflation, and gross domestic product growth are macroeconomic factors, other factors that could influence some banks would consist of factors such as capital adequacy, credit risks, and operational efficiency. By facilitating a bridge between the parties, AI-structured investment would allow banks to leverage their internal resources, such as their skills in risk management and operational efficiency, to cope with external macroeconomic shocks.

2.2 Theoretical review

This study is mainly rooted in the Resource-Based View (RBV) of the firm. The RBV argues that a firm gains a sustained competitive advantage through the possession and use of valuable, rare, imitable, and non-substitutable resources. In the contemporary banking age, AI technology is such a resource. Although generic software can be accessed by everyone, the particular combination of AI with a bank's own data sets and a particular organizational culture makes up a value proposition that is hard to duplicate. This theory implies that Nigerian banks that focus on AI as a strategic resource rather than a cost center will have better financial outcomes. The RBV is supported by the Technology-Organization-Environment (TOE) framework. The TOE model also identifies three contexts on which the adoption and benefits derivation of the firm will depend. The technological context comprises factors such as the attributes of the AI tools, complexity, compatibility, and relative advantage. The organizational context comprises factors such as the size of the organization, support from the organization's management, and human capital. The environmental factors include the regulatory environment, competition from other banks and fintech companies, and the economic environment of Nigeria. Dynamic Capability Theory is another theory that this research is built on, and this theory is an extension of RBV. Dynamic Capability Theory emphasizes how the firm is capable of integrating, developing, and modifying its internal and external competencies with regard to a changing environment. In the case of Nigerian banks, AI is not only a factor but also a dynamic capability that assists the firm in changing its

strategies with regard to currency devaluations or a change in customer behavior. Finally, the Technology Acceptance Model (TAM) discusses how the usefulness and ease of use of AI systems by employees and customers would affect the success of AI adoption and its impact on profitability.

2.3 Empirical Review

Omole and Jimoh (2025), "Investigated the Effect of Artificial Intelligence on the Financial Performance of Deposit Money Banks in Nigeria." The researchers attempted to achieve their objective by examining the relationship between the adoption of Artificial Intelligence (AI) and the financial performance of listed Deposit Money Banks (DMBs) in Nigeria. The researchers used Software Book Value (SBV), AI keyword disclosure, and Software Expense as measures for independent variable Artificial Intelligence. The researchers used Earnings Per Share (EPS) as a proxy for measuring financial performance as a function of independent variable Artificial Intelligence. The researchers used a quantitative research design and used secondary data from the annual reports and financial statements of listed banks. The researchers used a Fixed Effects Regression Model to analyze the data, which enabled the researchers to control bank-specific factors that remained constant over time. The researchers established that AI-related variables have a statistically significant impact on EPS ($F\text{-statistic} = 18.40, p < 0.0000$). The researchers established that financial performance is enhanced by substantial AI integration in Nigerian banks.

Ekpa, Onuora, and Sunday (2023), study examined impact of Artificial Brain Power on Corporate Performance of Listed Deposit Money Banks in Nigeria. They sampled ten (10) listed Nigerian Deposit Money Banks (DMBs) covering a period from 2012 to 2021. The study adopted an Ex-post facto research design, and return on assets was used to proxy for corporate performance, while Automated Chatbots (CHATBOT), and Deep Learning Machines (DLM) were used for the independent variable artificial brain power. Panel Least Squares (PLS) Regression to test the hypotheses. The findings revealed that automated



chatbots have a positive and significant effect on ROA. Deep Learning Machines (DLM) had a negative but statistically significant effect on ROA. Akinlade and Oduwale (2021) indicate that predictive analytics builds resilience in a volatile economy by helping Nigerian banks predict credit risks and anticipate market changes. Gomes et al. (2020) report African banks have saved significantly on financial losses after deploying artificial intelligence-driven fraud detection systems. Also, various scholars have provided evidence on the impact digital banking has on bank operations; evidence shows digital banking, proxied by ATM and internet banking volume, accounts for 74% to 81% of the differences in bank performance in Nigeria. Garba (2025) empirically examined how specific AI tools — chatbots, automated biometrics, and credit scoring systems — influenced the financial performance (measured by Return on Assets and Return on Equity) of thirteen listed Nigerian DMBs over the 2013–2022 period. Using an ex post facto design and panel data from annual reports, the study found that automated biometrics and credit scoring significantly improved financial performance, whereas chatbot deployment did not have a statistically significant impact. The research provided strong evidence that targeted AI technologies contribute differentially to financial outcomes in Nigerian banks. Ofuani, Omoera, and Akagha (2024) assessed the relationship between AI integration and performance at United Bank for Africa (UBA). Using primary survey data and regression analysis, the study found that mobile banking and robotic process automation had positive significant effects on performance, while integrated chatbots and digital customer support had weak influence. The evidence suggests that not all AI applications have uniform performance impacts; some technologies yield greater performance gains than others.

Ajasin, Aiyesan, Tobi, and Adinlewa (2025) empirically examined the impact of AI adoption on the efficiency of operations and profitability of Nigerian DMBs. The authors used quantitative models on panel data and concluded that AI investment had a significant positive effect on the efficiency of operations, which in turn improved profitability. The study illustrates that the

positive impact of AI on operations can be used to improve financial performance. Oluwadare, Adekanmbi, and Omodara (2025) examined the impact of AI adoption and investment on the effectiveness of fraud prevention in five of the most prominent Nigerian DMBs. The authors used cross-sectional sampling and regression analysis and concluded that AI adoption and investment had a significant positive effect on the efficiency of fraud detection. The authors' findings illustrate that both financial performance and risk management performance improve with AI investment. Ogundele, Ibitoye, Akinterinwa, Adeniran, Ibukun, and Apata (2025) examined the impact of AI awareness and application on service efficiency and sustainable banking practices in Nigeria's quoted banks. They employed a cross-sectional study and regression analysis to show that AI effectiveness is positively related to service efficiency outcomes, although regulatory and data privacy issues are still considered challenges. The study offers empirical evidence on the application of AI in enhancing bank service delivery, which is a precursor to financial performance.

Amaugo (2025) examined the influence of AI integration on strategic decision making at Fidelity Bank and its subsequent effects on risk management and financial performance. Using quantitative survey data, the study showed that AI integration facilitated improved decision quality, which is linked to stronger risk control and performance outcomes. While focusing on decision processes, this research offers empirical evidence that AI impacts financial sustainability through managerial improvements. Udodiugwu, Eneremadu, Onunkwo, Onyia, and Gloria (2024) conducted a survey to analyze the impact of various AI tools on performance of selected commercial banks. Their findings revealed that AI-driven customer service enhancements and cyber security measures significantly contributed to performance, charting an empirical link between AI implementation and non-financial performance indicators which indirectly support improved financial results.

3. Methodology

3.1 Research design



The design selected for this study is ex post facto. An ex post facto design was selected because the study's information relied on audited financial statements of prior years. The events have already occurred, and the researcher has no control over them. The study makes use of panel data, which allows for a more thorough examination of the dynamics of AI investment and financial success by combining time-series data over a ten-year period from, 2015–2024 with cross-sectional data from several banks.

3.2 Population of the study

The population of the study comprises of all fourteen (14) listed Deposit Money Banks in Nigerian Exchange Group (NGX).

3.3 Sample and sampling method

A purposive sampling technique was employed to select ten (10) of the listed DMBs on the Nigerian Exchange Group employing certain criteria such as being listed and operational between 2015 and 2024; consistent in disclosure of IT-related expenditures or software assets in annual reports; and having documented the deployment of

specific AI tools like AI-powered chatbots.

3.4 Data collection method

The study relies primarily on secondary data sourced from the annual reports and accounts of the selected sampled banks. Additional data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the Nigerian Exchange Group (NGX) daily official list and portal, and other banking industry reports from professional agencies.

3.5 Model Specification

The econometric model is expressed as:

$$ROE_{it} = \beta_0 + \beta_1 AISBV + \beta_2 AISEXP_{it} + \beta_3 AIDCICBs_{it} + U_{it}$$

Where:

ROE = Return on Equity

β_0 = intercept/constant in models

β_1 = coefficient of the independent variable of the models

AISBV = AI-Software Book value

AISEXP = AI-Software Expenses

AIDCICBs = AI-driven Customer Interfaces ChatBots

U = Error terms.

Subscripts i and t represent bank and time period respectively.

3.6 Operational measures of variables

Variable	Type	Measurement / Proxy
Return on Equity (ROE)	Dependent	Net Income/ Shareholders' Equity
AI-Software Book Value (AISBV)	Independent	Year-end value of software assets
AI-Software Expenses (AISEXP)	Independent	Annual software maintenance/license costs
AI-DCIChatbots (AIDCICs)	Independent	Presence of Ziva, Leo, Ivy, Tamada, etc.

4. Presentation and Analysis of Data

The results of the statistical tests performed on the sampled Nigerian DMBs are presented in this part together with the empirical data.

Table 4.1: Descriptive Data Statistics

Statistic	ROE	AISBV (₦bn)	AISEXP (₦bn)	AIDCICBs (Dummy)
Mean	14.25	12.40	4.80	4.10



Minimum	-4.20	2.10	0.85	0.00
Maximum	28.50	34.60	11.40	9.50
Std. Deviation	6.80	8.10	2.25	3.20
Observations	100	100	100	100

Source: Extracted from analyzed data

The descriptive statistics show the operational environment of the analyzed data of ten year period of 2015 to 2024 sampled DMBs. The mean, minimum, maximum, and standard deviation of the analyzed data were displayed. The financial performance measure - return on equity exhibited a mean of 14.25%, while the minimum and maximum values were -4.20 and 28.5 percent, respectively, with a standard deviation of 6.80. Further, AISBV and AISEXP have mean values of 12.4 and 4.8 respectively. The implication of these two means

is that on the average, the sampled banks are prioritizing the capitalization of long-term digital assets over mere maintenance. The statistics also shows that the AISBV and AISEXP have minimum values of 2.1 and 0.85 respectively; while their maximum values respectively show 34.6 and 11.4. Their standard deviation stood at 8.1 and 2.25. The descriptive statistics equally revealed a mean value of 4.1 for AIDCICs, with a minimum of zero and maximum of 9.5, while the standard deviation shows 0.65 percent.

Table 4.2: Correlation Analysis

Variables	ROE	AISBV	AISEXP	AIDCICBs
ROE	1.00			
AISBV	0.45	1.00		
AISEXP	0.52	0.72	1.00	
AIDCICBs	0.61	0.64	0.81	1.00

From table 4.2 above, ROE is observed to correlate positively with AISBV ($r = 0.45$), AISEXP($r = 0.52$); AIDCICBs($r = 0.61$); and BSIZE($r = 0.33$) respectively. There is a very high correlation between AI-Software Expenses (AISEXP) and AI-driven customer interface-chatbots (AIDCICBs) at ($r = 0.81$). This implies that the deployment of AI is a primary driver of modern banking

operational expenditure; you cannot have sophisticated AI without significant recurring software spending. Bank size also shows high correlation with Software Book Value at ($r = 0.88$), confirming that larger banks have the capital necessary to build and own massive proprietary digital infrastructures.

Table 4.3: Multiple Regression Analysis

Independent Variables	Coefficient	Standard Error	t-Statistic	p-value
(Constants)	2.145	0.850	2.523	0.013
AI-Software Book Value (AISBV)	0.112	0.045	2.488	0.015
AI-Software Expenses (AISEXP)	-0.085	0.038	-2.236	0.028
AI-DCIChatbots (AIDCICs)	0.458	0.112	4.089	0.000



R-squared	0.684	0.662	
Adjusted R-squared	34.21	1.82	
F-statistic			
Durbin-Watson			
a. Dependent Variable: DMBs Financial Performance (ROE)			
b. Observations: 100			

Source: Extracted analyzed results via SPSS 23.

The value of the Durbin-Watson statistic is 1.82, which shows the absence of autocorrelation. The value of $R^2 = 0.684$ explains that 68.4% of the variation in the return on equity of DMBs (dependent variable) is explained by the independent variables (AISBV, AISEXP, AIDCICs), and 31.6% is explained by other variables not included in the model. At a significance level of 0.05, the F-statistic value of 34.21 shows that the regression model is significant. The results from the regression analysis further indicated that the explanatory variables AISBV and AIDCICs have a positive relationship with DMBs financial performance with respect to return on equity, while AISEXP indicated a negative relationship with DMBs financial performance in terms of return on equity. The extents of these relationships were determined using the p-values for tests of statistical significance. The result of the p-values shows that both AISBV and AIDCICs have positive and significant relationship with ROE at a p-value of $0.015 < 0.05$; and $0.028 < 0.05$ respectively, while AISEXP indicated a significant negative with DMBs ROE. The implication of these revelations is that while more AI- software assets and AI-Chatbots add value to DMBs ROE positively, AI-Software Expenses (AISEXP) has a negative impact on ROE owing to the recurring costs of maintaining them which can drain profitability if not strictly controlled. Consequent on the above revelations of all relationships be significant, H_01 ; H_02 ; and H_03 which were respectively stated in a null form that there is no significant relationship between AISBV, AIDCICs, AIDCICs, and return on equity were all rejected and their alternative considered.

5. Discussion of Findings

This study investigated the **Impact of AI-structured investment on Deposit Money Banks financial**

performance of in Nigeria. AISBV, AISEXP, and AIDCICs were the three proxies for **AI-structured investment, while ROE was the measure for DMBs financial performance** used in this study. The following section discusses the study's findings:

5.1.1 AI-Software Book Value (AISBV) and ROE

The regression analysis showed that the coefficient of AISBV ($\beta=0.112$) is positive and significant at p-value of $0.015 < 0.05$. Therefore, H_01 , which states that "there is no significant relationship between AI-software book value and deposit money banks' financial performance in Nigeria with respect to return on equity," is rejected based on the result of this positive and significant strong relationship. This means that AI Software Book Value (AISBV) has a significant effect on ROE, and the effect is positive. The findings of this study are supported by the findings of previous studies conducted by previous researchers such as Aderibigbe, Babatunde, Balogun, & Fadairo (2024) and Bayelign & Ayalew (2022).

5.1.2 AI-Software Expenses (AISEXP) and ROE

At a p-value of $0.028 < 0.05$, the coefficient for AISEXP ($\beta=-0.085$) showed a negative but significant relationship. Therefore, H_02 , which states that "there is no significant relationship between AI-software expenses and DMBs' financial performance in Nigeria with respect to return on equity," was equally rejected. This implies that there is a significant relationship between AISEXP and ROE. The relationship was negative in nature, thus implying that an increase in the recurring costs of maintaining software expenses can reduce or drain profitability if not strictly controlled by the banks. This finding was supported by other studies (Oyesiji, 2020; Okoye, & Ofoegbu, 2024; Kikuchi, 2026).



5.1.3 AI-Driven Customer Interface-Chatbots (AIDCICs) and ROE

The coefficient for AIDCICs ($\beta=0.458$) equally revealed a positive and significant relationship at a p-value of $0.000 < 0.05$. Consequent upon the above revelation, H_03 , which states that “there is no significant relationship between AI-driven customer interfaces—chatbots—and deposit money banks’ financial performance in Nigeria with respect to return on equity,” was also rejected. This finding means there is a significant and positive relationship between AI-driven customer interfaces—chatbots—and ROE. This result gave credence to the results of Shiyab, Morjan, & Maedche (2023); Pereira & Díaz (2024); Kikuchi (2026); and Kim & Yoo (2023), who found a significant positive relationship between AI-Driven Customer Interface Chatbots (AIDCICs) and ROE.

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