The Role of Artificial Intelligence in Enhancing the Performance of Banks in Nigeria

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ABSTRACT

Purpose: The study aimed to examine the impact of artificial intelligence on the performance of selected commercial banks in Nigeria.
Methodology: We conducted a survey of 128 employees from Access Bank, Fidelity Bank, Guaranty Trust Bank, and First Bank of Nigeria in Awka, using a five-point Likert-scale questionnaire. The reliability, measured by Cronbach Alpha, was 0.753. Data analysis was performed using linear regression in SPSS version 23.
Findings: Implementing AI in customer service improves banks' non-financial aspects, while strong cyber security measures enhance financial performance.
Limitation: In our research, we took a close look at four banks in the Nigerian banking sector, recognizing the vital role they play in people's lives. We focused on two key areas of artificial intelligence customer service AI and cyber security AI because we understand how important it is for institutions to provide support and ensure the safety of their customers.
Contributions to Knowledge: Our research has highlighted the crucial role of integrating AI tools within banks to boost overall performance. Additionally, it has underscored the necessity for bank customers to leverage these AI solutions for improved service and interaction.

1. INTRODUCTION

The world has transformed into a global village due to advanced technology and its application across various fields of human endeavor (Tanha, Siddique, Sumon, Nurulhoque, Sazin, & Hossain, 2023). From the comfort of our homes, we now have the ability to communicate with family, friends, business associates, and colleagues, all thanks to information and communication technology (ICT). A significant branch of ICT, known as Artificial Intelligence (AI), has become essential in the corporate world, governance, socio-economic sectors, and even households (Chaudhary, 2022). In today's technologically advanced landscape, functioning effectively and efficiently without AI is nearly impossible. Sehirli and Alesmaeil (2022) suggest that the primary purpose of AI is to assist humans in specific functions and activities, as it has been designed to think and learn in a manner similar to that of humans. The banking sector, in particular, is continually striving to reduce liabilities and enhance asset portfolios. To achieve systematic compliance management and operations, a swift and effective strategy is necessary (Udodiugwu, Eneremadu, Obiakor, Okeke, & Njoku, 2023). AI plays a crucial role in the banking and financial industries, facilitating the delivery of affordable and reliable banking services (Mahar & Ghumro, 2020; Udodiugwu, Obiakor, Onyia & Ilonze, 2022). Artificial Intelligence (AI) can be either machines or software, and its use depends on human needs. The banking sector, like other industries, uses AI in both forms to support daily activities (Ramana, Katta, Rao, Rao & Raja, 2022). Without relying on paper, AI helps banks manage inventories, conduct risk assessments, and balance cash and cheque transactions for better performance (Eneremadu, Chikezie, & Udodiugwu, 2023). According to Ness, Volkivskyi, Muhammad, and Balzhyk (2024), AI mimics human intelligence to create advanced machines that perform tasks efficiently. Ramana *et al.* (2022) explained that AI works similarly to the human brain, as it can think and make decisions accurately based on the information it receives. We argue that AI is becoming more common in today's market, with banking being just one area of its application.

The banking industry plays a significant role in Nigeria's economy and is among the largest employers (Tubaro, Casilli & Coville, 2020; Hallak, Assaker, O'Connor, & Lee, 2018), as it is directly connected to all private and public corporations, as well as non-governmental organizations, due to its function in helping these entities maintain their financial assets. Employees in Nigerian banks and other institutions undergo various training programs before they are hired and assigned specific duties. Westerman, Edwards, Edwards, Luo, and Spence (2020) mentioned that these training programs

are conducted with the assistance of artificial intelligence. As noted earlier, the banking sector employs artificial intelligence for its routine operations. Some examples of this artificial intelligence include Risk Management AI, Customer Service AI, Fraud Detection and Cyber Security AI, Process Automation AI, Predictive Analytics AI, and Regulatory Compliance AI, among others (Volovici, Syn, Ercole, Zhao & Liu, 2022; Gruener & Raastad, 2018). These AI systems are utilized by banks to alleviate boredom that may occur among employees (Umamaheswari, Valarmathi & Lackshmi, 2023) from performing the same repetitive tasks over extended periods, while still enhancing overall performance at an optimal level. Technology has significantly impacted various sectors of the Nigerian economy, particularly restructuring social skills and the workforce. Artificial intelligence (AI) is prominently transforming the banking sector, enhancing customer relationship management (Maja & Letaba, 2022; Selwyn & Gallo Cordoba, 2022). AI is driving a shift toward more customer-centric approaches, as highlighted by Lin and Lee (2023). The introduction of Automated Teller Machines (ATMs) marked a significant change, allowing customers to perform transactions without human assistance (Safari, Bisimwa, and Armel, 2020; Sundar & Lee, 2022). This innovation contributed to the increased demand for AI in banking (Russell & Norvig, 2022).

This study provides an insight into the transformative role of Artificial Intelligence (AI) in the banking sector, highlighting both its challenges and opportunities. Ng and Leung (2020) suggest that while AI can enhance efficiency, it may also restrict employees' potential by fostering over-reliance on technology for task execution. This sentiment is echoed by Ninness and Ninness (2020), who argue that such dependence can impede skill development. Adam et al. (2021) underscores the necessity for regular updates and monitoring of AI systems to ensure their effectiveness, as failure to do so could result in malfunctions and diminished performance in banking operations. With customer demands continually evolving, the banking sector is increasingly adopting digitalization to meet these challenges (Banas *et al.,* 2022; Chowdhury *et al.*, 2019). Institutions that actively engage in this digital transformation are likely to prosper, whereas those reluctant to embrace these advancements risk becoming obsolete (Canavilhas, 2022; Ciancaglini *et al.*, 2020). The ongoing integration of AI, robotics, and advanced technologies into operational processes opens up significant opportunities for banks to enhance efficiency and service quality (Dehnert & Mongeau, 2022). This study aims to investigate the impact of AI on performance in

selected commercial banks in Nigeria, thereby contributing to a deeper understanding of its advantages within the industry.

1.1 Statement of Problem

The banking sector has observed an increase in investments in artificial intelligence (AI), leading to new concerns about data security, management, and transparency. Silva (2021) suggests that as data management techniques evolve in response to the implementation of new AI solutions, the challenges associated with AI in the banking sector have become notable issues that require attention (Ness *et al.,* 2024; Abdulai, Knauf, & O'Riordan, 2020). It is important for the management of commercial banks in Nigeria to recognize the emerging challenges related to the application of AI in the workplace. Developing more effective strategies to address these challenges may contribute to improved banking performance (Priyadarshini *et al.,* 2022). Roseline (2022) highlights that a significant concern in adopting AI within commercial banks in developing countries is resistance to new approaches and adaptation to these changes. According to Vadapalli (2024), many commercial banks currently face challenges related to the adoption of new methods. The banking sector has demonstrated a commitment to delivering services in accordance with regulated policies and standards aligned with the Central Bank of Nigeria (CBN) acts. However, Vadapalli also notes that some commercial banks have not shown the necessary commitment to upskilling their workforce and enhancing human resource skills. Furthermore, due to insufficient supporting data for implementing operational changes, the banking sector is experiencing disconnect between the demands and inquiries of their customers (Singh & Pathak, 2020; Abubakre, Faik, & Mkansi, 2021).

Consequently, banks are adapting to changes that may not fully meet the actual requirements of a broader customer base. Hinge (2022) highlighted that banks leveraging artificial intelligence must adhere to regulatory standards, especially concerning privacy in services like net banking and online transactions. There's a notable shortfall in training for the existing workforce on advanced AI tools (Doumpos *et al.*, 2022). As AI use grows, there's a demand for skilled professionals in data science and machine learning to ensure data credibility. While AI's impact in banking is significant, it raises challenges, particularly around data security and privacy (Narang *et al.,* 2024; Bejjani *et al.,* 2023; Akanpaaba *et al.,* 2022). To safeguard customer privacy and prevent data breaches, stringent security measures are essential in the financial sector. This study aims to address these concerns through specific research objectives and questions.

1.2 Objective of the Study

- To examine the impact of Customer Service AI on the non-financial performance of selected commercial banks in Nigeria.
- To analyze the effect of Cyber Security AI on the financial performance of selected commercial banks in Nigeria.

1.3 Hypotheses

- Customer Service AI clearly does not impact the non-financial performance of selected commercial banks in Nigeria.
- Cyber Security AI definitely does not affect the financial performance of selected commercial banks in Nigeria.

2. LITERATURE REVIEW

2.1 Artificial Intelligence

Scholars across various disciplines have characterized and interpreted the idea of Artificial Intelligence based on their unique perspectives. In the realm of media and communication studies, Zúñiga, Goyanes, and Durotoye (2023) view AI as a tangible ability of non-human machines or artificial entities to perform tasks, solve problems, communicate, engage, and reason logically, similar to biological humans. They also contend that AI's existence is not solely reliant on human intelligence for definition, asserting that its operationalization hinges on two aspects: performance level and autonomy level. In the domain of computer science and information technology, Sundar (2020) defines Artificial Intelligence (AI) as a branch dedicated to creating computer programs that accomplish tasks traditionally performed by humans. Vergeer (2020) states that AI algorithms are capable of handling tasks involving learning, perception, problem-solving, language comprehension, and logical reasoning. Another scholar in Information Technology describes AI as a facet of computer science focused on developing intelligent computer systems that can perceive, analyze, and respond appropriately to inputs. According to Oyeniyi, Ugochukwu, and Mhlongo (2024), Artificial Intelligence (AI) has emerged as a crucial driver of transformation across numerous sectors, with the banking industry witnessing some of the most significant changes due to this technological evolution. The adoption of AI in banking signifies a purposeful and strategic transition aimed at improving operational efficiency, enhancing customer experiences, and fostering financial innovation.

2.2 Customer Service AI

Artificial intelligence (AI) is transforming customer service by enhancing the overall experience (Oyeniyi *et al,* 2024). Positioned prominently in banks, customer service is crucial for engagement, and AI is increasingly relied upon to assist customer service officers in their tasks. This includes the use of AI technologies like self-service, sentiment analysis, and natural language processing (Priyadarshini *et al,* 2022; Vadapalli, 2024). AI integration not only fosters positive customer experiences but also offers opportunities to manage large volumes of data, reduce handling times, minimize repetitive tasks, improve efficiency, and enhance service quality (Udodiugwu, 2023; Kaplan & Haenlein, 2020; Russell & Norvig, 2022; Mingas, 2023).

Fig. 1. Customer service robotic
Rubkiewicz (2023).

Figure 1 shows a customer service robotic AI that acts as customer service personnel. It is designed to address customer needs and provide information during working hours. This technology is common in tech and motor companies in the Western world, where it assists with complex automated tasks.

2.3 Cyber Security AI

The importance of cyber security cannot be overlooked due to the interconnected nature of security measures (Phythian, 2013). Regardless of whether security is managed by humans or technology, its purpose is to protect valuable assets. Cyber Security involves safeguarding digital assets against theft, disruptions, and disasters. Meanwhile, Cyber Security Intelligence focuses on collecting and analyzing information about cyber threats to enhance security efforts (Comdt, 2023; Kaspersky, 2024). This encompasses understanding the tactics of cyber adversaries and includes knowledge about potential threats to help mitigate attacks (Berndt & Ophoff, 2020; Udodiugwu et al., 2022). Sources of cyber threat intelligence range from open-source intelligence to data from social media, device logs, and information from the deep and dark web (CyberProof, 2024; Gerard, 2020).

2.4 Non Financial Performance

Non-financial performance measures are significant predictors of future economic trends in Nigeria's banking sector (Samad, 2020; Kurdi & Alshurideh, 2020). According to Lin and Huang (2021), these indicators connect value-driving activities with organizational performance. Mwosi et al. (2024) suggest a close relationship between non-financial performance and both corporate and business strategies. We argue that metrics such as brand preference, innovation, employee satisfaction, customer retention, and satisfaction enhance overall performance in financial institutions (Emmanuel, 2021; Abbas *et al.,* 2021; Chen, Chen, & Leung, 2023). These metrics help firms assess success in specific areas without financial measures (Ahmed & Alam, 2015; Guluma, 2021). Rawal and Gopalkrishnan (2024) note that non-financial metrics focus on future performance rather than monetary values. For instance, insufficient marketing resources can lead to a drop in sales in subsequent quarters (Indeed Editorial Team, 2024). Rienda et al. (2019) emphasize that aligning non-financial measures with business strategy is crucial since mission statements typically focus beyond financial metrics (Saha & Maji, 2023; Udodiugwu, 2022). Non-financial metrics like brand awareness are often more reflective of a company's success than fiscal indicators.

2.5 Financial Performance

Financial performance evaluates a firm's overall standing in areas such as assets, liabilities, equity, expenses, revenue, and profitability (Reza & Faysal, 2021; Olayinka & Lawan, 2023). While financial measures mainly reflect past performance, they often lack context regarding performance drops. Research on bank performance, noted by Enad and Gerinda (2022), highlights its multidimensional nature, including financial and market performance, human resource effectiveness, organizational efficiency, and customer focus (Nyathira, 2012; Omar & Javaria, 2019). Verma (2024) describes financial performance as an assessment of how well financial

objectives are achieved, vital for risk management. Afolabi *et al.* (2019) view it as measuring a firm's policies and operations in monetary terms, aiding comparisons within industries (Akbarian, 2020; Ethelmary *et al.,* 2023).

2.6 Benefits of Artificial Intelligence in Banks

Artificial Intelligence (AI) plays a crucial role in FinTech by addressing challenges such as customer experience personalization, brand loyalty, and fraud prevention. The banking industry has embraced AI to enhance its infrastructure and invest in new technologies (Reim, Åström, & Eriksson, 2020). According to Ramamurty, Kumar, and Nagaraj (2021), key areas where AI benefits the banking sector include, improving sales and marketing pricing Optimization, cost reduction, risk reduction, improving employee productivity, improving process efficiency and enhanced security and data protection.

2.7 Theoretical Review

This study is based on Robert Sternberg's Triarchic Theory of Intelligence, proposed in 1985, which comprises three components: Analytical, Creative, and Practical Intelligence. Analytical Intelligence involves analyzing and evaluating information, identifying patterns, and solving problems, aligning with traditional views of intelligence. Creative Intelligence is the ability to generate new ideas and find innovative solutions, emphasizing imagination and adaptability. Practical Intelligence refers to applying knowledge in real-world situations and effectively navigating social contexts, requiring common sense and wisdom. We chose the Triarchic Theory due to its relevance to understanding human intelligence and its connection to artificial intelligence. We believe AI mirrors human reasoning, designed to address human challenges. Additionally, Nigerian banks utilize this approach to resolve customer issues, enhance product efficiency, and improve customer satisfaction. Sternberg's theory offers a comprehensive framework that accounts for various intelligence aspects, emphasizing practical application and individual differences in strengths and weaknesses.

Criticism and Limitations of Triarchic Approach to Intelligence Theory.
Lack of Empirical Support: The triarchic approach to intelligence theory lacks sufficient empirical backing in research. In a developing nation like Nigeria, the full embrace of Artificial Intelligence is rare due to concerns about job displacement. We suggest that exposure to AI in academia could spark curiosity and lead to more empirical investigations.
Overemphasis on Individual Differences: This theory emphasizes individual strengths and weaknesses over general intelligence. Ultimately, the Triarchic Approach offers a refined and multifaceted understanding of AI, acknowledging its inherent complexities.

2.8 Empirical Review

The study reviews recent empirical research on the impact of artificial intelligence (AI) on bank operations and performance. Key findings include:

Gumbo *et al.* (2024) from Zimbabwe found that Conversational AI improves operational efficiency in banks by enhancing customer service, reducing costs through automation, and improving workflow. Mishra *et al.* (2022) from the U.S. explored how firms' focus on AI in their 10-K reports relates to their operating efficiency, concluding that U.S. firms are undergoing a transformation regarding AI. Shiyyab *et al.* (2023) in Jordan analyzed the use of AI in banking operations and found growing disclosure of AI-related terms in annual reports, indicating that banks are still in early adoption stages. Muhammad *et al.* (2024) from Pakistan studied the impact of AI investment on bank performance, revealing that such investments positively influence performance metrics like net profit margin and return on equity. Overall, the findings suggest a positive correlation between AI adoption and enhanced bank performance and operational efficiency.

2.9 Gap in Knowledge

The study of AI is gradually making inroads across various academic fields, although some organizations and small businesses in developing nations are still hesitant to adopt AI technologies in their daily operations. Some scholars argue that AI has significantly enhanced the performance of banks and other financial institutions that have embraced its integration (Smit, 2024; Muhammad, Siraj, Abdali, & Mehboob, 2024; Gumbo, Mashizha, Simon, & Phiri, 2024). Conversely, others contend that AI poses adverse effects on human capital development and talent growth (Shiyyab, Abdallah, Qais & Hashem, 2023). Notably, the perspective of Mishra, Ewing, and Cooper (2022), which suggests that US firms are on the brink of transformation, sparked our interest in this research investigation. We aimed to explore the impact of AI on Nigerian banks and to assess the level of AI utilization within these institutions.

3. METHODOLOGY

For our study, we employed a comprehensive cross-sectional survey method, which allowed us to gain in-depth insights into the variables we focused on: Customer Services AI and Cyber Security AI. Our research population consisted of employees from Access Bank, Fidelity Bank, Guaranty Trust Bank, and First Bank of Nigeria, all located in Awka. We surveyed a total of 128 employees across various departments, specifically the Customer Services Department, Cyber Security Department, and Transaction Services Department. To collect data, we utilized a well-structured Likert survey questionnaire, designed on a five-point scale. This approach was instrumental in capturing nuanced responses from our participants. To ensure that our research instrument was valid and reliable, we sought the expertise of professionals in the fields of Artificial Intelligence and Cyber Security. They conducted thorough face and content validation of our questionnaire. Furthermore, experts in Banking and Finance reviewed the instrument to ensure it accurately reflected the context, content, and metrics, thereby enhancing its robustness in yielding meaningful results. The key variables we measured related to Artificial Intelligence encompassed Cyber Security AI and Customer Service AI. In evaluating performance, we looked at both financial metrics—such as Revenue and Labor Productivity—and non-financial metrics, which included Customer Satisfaction and Employee Satisfaction. To assess the reliability of our research instrument, we employed Cronbach's Alpha, resulting in a reliability value of 0.753. This high value reassured us of the instrument's effectiveness, as detailed in Appendix Table 2. For hypothesis testing, we utilized the linear regression model available in the Statistical Package for Social Sciences (SPSS) version 23, which facilitated a thorough analysis of our findings.

4. ANALYSIS AND RESULTS

Table 1. Sex of Respondents

		Frequency	Valid Percent
Valid	Male	46	35.9
	Female	82	64.1
	Total	128	100.0

Source: Researcher's computation using SPSS version 23, 2024

The table above shows the sex distribution of survey respondents. Of the participants, 46 (35.9%) were male and 82 (64.1%) were female, indicating that a higher proportion of bank staff participants were female. This suggests that females are more likely to work in banks.

Table 2. Educational Qualification of Respondents

		Frequency	Valid Percent
Valid	HND	36	28.1
	B.Sc	40	31.3
	M.Sc/MBA	6	4.7
	Ph.D	19	14.8
	Professional Certificate	27	21.1
	Total	128	100.0

Source: Researcher's computation using SPSS version 23, 2024

The table indicates that 36 participants (28.1%) were HND holders, 40 (31.3%) held Bachelor's degrees, 6 (4.7%) were Master's holders, 19 (14.8%) had Ph.Ds, and 27 (21.1%) possessed professional certificates. This shows that the Nigerian banking sector supports the career and self-development of its staff through higher educational attainment.

Table 3. Name of Bank

		Frequency	Valid Percent
Valid	Access Bank	32	25.0
	Fidelity Bank	32	25.0
	First Bank	32	25.0
	Guaranty Trust Bank	32	25.0
	Total	128	100.0

Source: Researcher's computation using SPSS version 23, 2024

The table shows that all four banks (Access Bank, Fidelity Bank, First Bank, and Guaranty Trust Bank) had equal representations, allowing us to confidently infer that all banks were equally represented.

Table 4. Department of Respondents

		Frequency	Valid Percent
Valid	Cyber Security Department	45	35.2
	Transaction / Operations Services	46	35.9
	Customer Services	37	28.9
	Total	128	100.0

Source: Researcher's computation using SPSS version 23, 2024

Table 4 shows that 35.2% of respondents were in Cyber Security, 35.9% in Transaction/Operations services, and 28.9% in Customer Services. This indicates that more bank staff are in Transaction/Operations services than in Cyber Security. Utilizing AI in banks could enhance worker efficiency and reduce redundancy.

Ho₁: Customer Service AI clearly does not impact the non-financial performance of selected commercial banks in Nigeria.

Table 5. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.812[a]	0.885	0.867	0.87699

a. Predictors: (Constant), Customer Service AI
Source: Researchers Computation on SPSS version 23

Table 5 above shows the Model Summary for the Linear Regression. The R value of 0.812 indicates a strong correlation between the variables. Since this value is higher than 0.4, it is a positive finding. The R-square value reflects how much of the variation in the dependent variable (Non-financial performance) can be explained by the independent variable (Customer Service AI). A value over 0.5 shows that the model is useful. In our case, the R-square value is 0.885, which is good. This means that 88.5% of the variation in non-financial performance can be explained by Customer Service AI, indicating a strong relationship. The Adjusted R-square value shows how well the results generalize to the larger population. We expect a difference between the R-square and the Adjusted R-square values. Here, the R-square is 0.885 and the Adjusted R-square is 0.867, which also indicates a good fit. Overall, the model summary looks strong and is satisfactory for moving forward. If the values had been lower, adjustments to the data would have been necessary to achieve better results.

Table 6. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.56	1	4.56	5.929	.000[b]
	Residual	96.909	126	0.769		
	Total	101.469	127			

a. Dependent Variable: Non-financial Performance
b. Predictors: (Constant), Customer Service AISource: Researchers Computation on SPSS version 23

Table 6 illustrates that the linear regression model effectively predicts the outcome of the dependent variable. For this study, a 95% confidence interval, equivalent to a 5% significance level, was established. Consequently, we anticipated that the p-value would be less than 0.05. In our findings, a p-value of 0.000 was obtained, indicating a statistically significant result for the research. Additionally, the F-ratio serves as a measure of improvement in the model's predictive capacity, taking into account the inaccuracies inherent in the initial model. Typically, an F-ratio value greater than 1 suggests that the model is effective in its predictions. In this analysis, we found an F-ratio of 5.929, which confirms the robustness of our model.

Table 7. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.24	0.37		14.2	0
	Customer Service AI	-0.2	0.083	-0.212	-2.44	0

a. Dependent Variable: Non-Financial Performance Source: Researchers Computation on SPSS version 23

In our analysis, we focused on the significance (Sig.) value presented in the Coefficient table. To determine whether to accept or reject the null hypothesis, we used a key threshold: if the Sig value is less than 0.05, we reject the null hypothesis; if it is greater than 0.05, we do not reject it. A decision not to reject the null hypothesis indicates the absence of a significant impact. In our findings, the Sig value was recorded at 0.000, which is indeed less than 0.05. This prompts us to reject the null hypothesis, suggesting that Customer Service AI significantly influences the non-financial performance of selected commercial banks in Nigeria. Thus, we conclude that the impact of Customer Service AI on the non-financial performance of these banks is both notable and beneficial.

Ho₂: Cyber Security AI definitively does not affect the financial performance of selected commercial banks in Nigeria.

Table 8. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.849[a]	0.862	0.855	0.85351

a. Predictors: (Constant), Cyber Security AI
Source: Researchers Computation on SPSS version 23

Table 8 above illustrates the Model Summary for the Linear Regression analysis. The R value, located in the R Column, shows a simple correlation of 0.849, indicating a strong correlation. Generally, if the R value falls below

0.4, it warrants further analysis. However, since our R value of 0.862 exceeds this threshold, it reflects positively on the model. The R-square value represents the proportion of total variation in the dependent variable—financial performance—that can be attributed to the independent variable, Cyber Security AI. A value above 0.5 suggests that the model effectively captures the relationship. In our case, the R-square value is 0.862, which is quite robust. Additionally, the R2 value found in the R-square column reflects how much of the total variation in financial performance can be explained by Cyber Security AI. Here, the 86.2% figure is reasonably strong and indicates a significant relationship. The Adjusted R-square provides insight into the generalization of our results, representing how the sample data relates to the broader population in the context of linear regression. We typically expect to see some variation between the R-square and the Adjusted R-square. In our analysis, the R-square value of 0.862 is closely aligned with the Adjusted R-square of 0.855, which is also encouraging. Overall, the model summary table appears quite satisfactory for moving forward to the next steps. If the values were unsatisfactory, we would have needed to adjust the data until we achieved the desired results.

Table 9. ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.079	1	6.079	8.344	.000[b]
	Residual	91.788	126	0.728		
	Total	97.867	127			

a. Dependent Variable: Financial Performance
b. Predictors: (Constant), Cyber Security
Source: Researchers Computation on SPSS version 23

Table 9 presents compelling evidence that the linear regression model effectively predicts the outcome of the dependent variable. For this study, we selected a 95% confidence interval, corresponding to a 5% level of significance. This implies that we anticipate the p-value to be below 0.05; in fact, we obtained a p-value of 0.000, which clearly indicates a statistically significant result for our research. Additionally, we evaluated the F-ratio, a critical metric that measures the extent to which our model improves the prediction of the dependent variable while accounting for any inaccuracies inherent in the model. A value greater than 1 for the F-ratio suggests that the model is effective. In our analysis, we found the F-ratio to be 8.344, indicating a robust and effective predictive capability of our model.

Table 10. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.232	.384		8.415	.000
	Cyber Security AI	.251	.087	.249	2.889	.000

a. Dependent Variable: Financial Performance
Source: Researchers Computation on SPSS version 23

The significance value (Sig. value) presented in the Coefficient table was a key factor for our analysis. To determine whether to accept or reject the null hypothesis, we examined this value. A Sig value less than 0.05 indicates the null hypothesis should be rejected, while a value greater than 0.05 suggests it will not be rejected, implying that there is no significant impact. In our findings, the Sig value was recorded at 0.000, which is well below the 0.05 threshold. This leads us to reject the null hypothesis and conclude that Cyber Security AI does significantly influence the financial performance of selected commercial banks in Nigeria. Our study confirms that the impact of Cyber Security AI on the financial performance of these banks is substantial.

5. DISCUSSION

The findings from our first hypothesis indicated a significant impact of customer service AI on the non-financial performance of selected commercial banks in Nigeria. By measuring non-financial performance metrics, specifically customer satisfaction and employee satisfaction, we discovered that customer service AI greatly benefitted bank employees in their daily tasks. The use of customer service AI reduced feelings of boredom and anxiety associated with repetitively manual routines. Additionally, the ease and flexibility provided by this technology minimized wait times for customers, leading to increased customer satisfaction. This aligns with the findings of Nwankwo (2023), which suggest that artificial intelligence technology significantly streamlines accounting processes and ultimately enhances the efficiency of accounting information systems. Nwankwo also noted that AI-driven insights profoundly affect non-financial metrics, contributing to the overall success of organizations. Similarly, the research conducted by Elegunde and Shotunde, (2020) demonstrated that customer satisfaction, service quality, competitive advantage, and employee efficiency—key non-financial business measures—are all positively influenced by artificial

intelligence. In contrast, our second hypothesis revealed a positive and significant impact of cyber security AI on the financial performance of selected commercial banks in Nigeria. We assessed financial performance through metrics such as revenue and labor productivity. The implementation of cyber security AI facilitated smooth transaction flows by automatically detecting fraudulent activities and alerting the cyber security department when such incidents occurred. Our findings indicate that customers are more willing to conduct transactions when they are assured of the safety of their funds and other financial assets held by the bank. Additionally, this is consistent with the study by Shiyyab, Alzoubi, Obidat, and Alshurafat (2023) and the study of Agbo and Egbunike, (2024), which found that the disclosure of AI-related keywords influences banks' financial performance. The research highlights two key findings regarding the impact of AI in Nigerian commercial banks.

Customer Service AI: It significantly enhances non-financial performance by improving customer and employee satisfaction. AI reduces routine-related boredom and anxiety for employees, while also minimizing customer wait times.

Cyber Security AI: This positively affects financial performance by ensuring secure transaction flows and increasing customer confidence in the safety of their funds. The study aligns with existing literature, indicating that AI influences both financial and non-financial metrics in banking.

6.   CONCLUSION

The integration of Artificial Intelligence (AI) in the banking sector has significantly increased in recent years, contributing to various benefits such as enhanced customer self-service, improved processing of customer requests, streamlined complex transaction processes, and reduced reliance on manual operations. Employees within the banking sector are increasingly recognizing the advantages of AI tools due to their accuracy and efficiency in handling a large volume of complex customer requests. There is an expectation among employees that customers will predominantly visit banks to address technical issues encountered while using online banking applications. From the customer perspective, there is also an interest in transacting through online platforms from their homes or workplaces rather than visiting physical branches to deposit cash or resolve issues. It is essential for bank management to prioritize restoring customer confidence, as dissatisfaction could lead to decreased patronage, impacting overall bank performance. The successful implementation of AI in banks requires not only technological integration but also acceptance from both employees and customers. Younger customers, particularly millennials, are typically more open to adopting AI tools due to their familiarity with advanced technology. However, challenges exist for customers in rural areas of Nigeria and other developing regions who may lack exposure to mobile technology. Additionally, older individuals may exhibit skepticism toward new technology due to concerns about security and fraud, necessitating strategies to encourage their engagement with AI. The benefits of cyber security AI in the banking sector are substantial. It enhances banks' ability to establish a proactive cyber security strategy and improves overall risk management. AI can aid in predicting and preventing cyber attacks, provide insights into active threats, and assist in data breach prevention. Furthermore, it can help reduce costs associated with data breaches and promote the sharing of knowledge and skills within the cyber security community. While the implementation of AI is expected to yield positive results in urban banks, responses may vary in rural areas. A gradual approach to AI implementation is suggested, beginning with training programs for bank employees to familiarize them with AI tools. Following employee training, efforts should be made to encourage customers to utilize these tools, along with clear communication about their benefits. Regular retraining for bank employees is recommended to keep them informed about advancements in AI. Additionally, it is advisable for bank management to reassure customers about the safety of their financial information by consistently upgrading cyber security measures. Training in cyber security for employees is crucial for maintaining optimal performance in the banking sector. Customers should also receive guidance on safeguarding their banking information to prevent unauthorized access to their accounts.

6.1   Contributions to Knowledge

This study has revealed the numerous advantages of incorporating artificial intelligence (AI) into the banking sector. It has highlighted how AI can streamline complex transactions, ultimately making processes more efficient and user-friendly. Additionally, the integration of AI technologies can significantly reduce operational costs associated with maintaining banking services and managing customer relationships. Furthermore, this research contributes to the existing body of literature by not only conceptualizing AI within the context of banking but also by expanding on established concepts. This deepened understanding of AI applications in finance paves the way for future innovations and enhancements in the industry, potentially leading to improved customer experiences and more sustainable banking practices.

6.2   Limitation of this Study.

We chose to focus our survey on a select group of banks in Nigeria, recognizing the unique challenges and opportunities they face. Our exploration centered on specific AI metrics, including customer service and cyber security, as we felt these areas could greatly impact both institutions and their customers. We genuinely encourage future researchers to broaden their study to encompass other facets of AI. There's so much potential to be discovered in different sectors beyond banking, and we hope that curious scholars will pursue these avenues with passion and dedication.

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APPENDIX

Table 1. Structured Questionnaire

Artificial Intelligence and Performance of Selected Commercial Banks in Nigeria					
Scaling Points: *5; Strongly Agree* *4; Agree* *3; Undecided* *2; Disagree* *1; Strongly Disagree.*					
Instruction: Please tick (√) in any option that suits your response. **Sex** Male Female **Educational Qualification (Please Specify)** .... **Name of Bank** Access Bank: .... Fidelity Bank: .... First Bank: .... Guaranty Trust Bank: .... **Department** Customer Services**:.........................** Cyber Security: .... Operations / Transaction Services**:......**					

S/N	ITEMS: **Customer Service AI and Customer Satisfaction**	5	4	3	2	1
1	Customer Service AI improves self-service options by offering personalized recommendations and assisting customers in navigating self-help resources.					
2	AI-powered customer service tools can help banks save valuable time and resources in the long run.					
3	AI-powered customer service tools empower customers to independently discover solutions to their issues, ultimately decreasing the necessity for human involvement and enhancing overall customer satisfaction.					
4	Maximizing the integration of AI into customer experiences can significantly elevate customer satisfaction and foster stronger loyalty.					
	Customer Service AI and Employee Satisfaction					
5	AI-powered customer service tools empower banks to automate experiences, streamline workflows, and assist agents.AI-powered customer service tools empower banks to automate experiences, streamline workflows, and assist agents.					
6	Customer Service AI is revolutionizing the way experiences are coordinated by creating a harmonious environment in which content employees provide outstanding customer experiences.					
7	Customer Service AI acts as a force multiplier, allowing employees to focus on higher-order tasks that require creativity, critical thinking, and emotional intelligence, all of which lead to employee satisfaction.					
8	Implementing AI in banks can create concerns about job security, potentially affecting employee well-being.					
	Cyber Security AI and Revenue					
9	By analyzing historical data and recommending optimizations, Cyber Security AI helps to identify cost-saving opportunities, leading to a leaner and more efficient operation, ultimately contributing to increased revenue.					
10	Cyber Security AI plays a highly important role in driving innovation in threat detection, incident response, and predictive intelligence.					
11	Cyber threats are attempts to secure unauthorized access to, change, or delete private information, to demand money from victims, or to disrupt business.					
12	Banks that have implemented AI are 15% less likely to have experienced cyber security incidents that lead to unplanned downtime of endpoints or network slowdowns					
	Cyber Security AI and Labour Productivity					
13	Banks that have implemented AI are 15% less likely to have experienced cyber security incidents that lead to unplanned downtime of endpoints or network slowdowns					
14	Having cyber-aware employees boosts productivity, as they are better equipped to recognize the signs of cyber-attacks.					
15	A single cyber attack can halt your bank's entire operation overnight					
16	Employee training in cyber Security can elicit a range of emotions that can be extremely helpful in improving cyber security and your overall workplace environment.					

Table 2. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.753	.767	16