ARTIFICIAL INTELLIGENCE ADOPTION FOR FINANCIAL SERVICES OPTIMIZATIONS AND INNOVATION BY COMMERCIAL BANKS IN NIGERIA

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ABSTRACT

This study investigates Artificial Intelligence (AI) adoptions for financial process innovation by commercial banks in Nigeria. Two specific objectives, two research questions and hypotheses were stated for the study. The variables of the study were AIs for fraud detection and personalized banking experience. A sample size of 143 selected from a population of 174 comprising accounting lecturers in public universities in Akwa Ibom State and bank managers, operational staff and key personnel in commercial banks operating in Uyo, Akwa Ibom State were used for the study. Descriptive survey research design was employed for the study. The research instrument used for the study is a researcher- developed questionnaire tagged "Artificial Intelligence Adoptions for Financial Process Innovation Questionnaire" (AIAFPIQ). The instrument developed by the researcher was face validated by three experts. The instrument was administered to 30 persons through test retest to establish the reliability. The result was then coded for testing using Cronbach Alpha technique. The reliability index yielded 0.89. The data generated was analyzed using Mean, standard deviation and t-test Analysis. Findings of the study reveal that AI can be applied for fraud detection and personalized banking experience. Furthermore, Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption artificial intelligence (AI) in fraud detection, and personalized banking experience in promoting financial process innovation by commercial banks in Nigeria. It is recommended among others that AIs should be systematically implemented by banks not just as a form of competition but as an overall business strategy.

KEYWORDS: fraud detection, personal banking experience, AIs in banks and AI adoption

Introduction

Financial innovation is the process of creating new products, services, or processes related to the finance management. These occur with the advancement in financial instruments and payment systems with time (Apoorva, 2021). As with most sectors of the economy, the drivers of innovation are mostly new technologies. Some types of financial innovation are driven by improvements in computer and telecommunication technology, the most recent being artificial intelligence and other associated fourth industrial technologies.

Artificial Intelligence (AI) is an automated display of creativity by electronic device as through initiated by human being. Leading AI textbooks define the field as the study of "intelligent agents": any system that perceives its environment and takes actions that maximize its chance of achieving its goals (Poole, et al, 1998). Other authors defined Artificial Intelligence (AI) as an articulation of happening in the environment and censored it for interpretation in line with the real life situation and take equivalent decision ad build in the machine system. AI is expected to have a disruptive effect on almost every sector of the economy and industries as well. Its effect is projected to be diverse and penetrating compared to what the internet did over the last couple of decades (Dumasia, 2021). The adoption of AI in different enterprises has increased due to the happenings in the global system. Since the pandemic hit the world, the potential value of AI has grown significantly. The focus of AI adoption is restricted to improving the efficiency of operations or the effectiveness of operations. However, AI is becoming increasingly important as organizations automate their day-to-day operations. Interest in artificial intelligence technology is sky-high in the banking and finance management. Outside of the technology sector, the financial services industry is the biggest spender on AI services and is experiencing very fast growth.

The reason for the high interest in AI for banks is vast and irresistible even for banks in developing nations like Nigeria. The strategic adoption of AI's many technologies -- including machine learning, natural language processing and computer vision can drive meaningful results for banks, from enhancing employee and customer experiences to improving back-office operations (Tucci, 2020). The adoption of artificial intelligence in the enterprise is profoundly changing the way businesses work. Companies are integrating AI technologies into their business operations with the aim of saving cost, increasing efficiency, generating insights, increase productivity and creating new markets. AI adoption in Nigeria is still at its infant stages and not widespread. It is still limited to the function of enhancing services to customers. Most especially, it is applied for diversifying and optimizing customer services. They are applied mostly through upgrades to existing infrastructure. Take for instance; banks now have Automatic teller machines with finger print assisted banking and broader services. However, the adoption of AIs is much deeper and wider in some countries.

There are AI-powered enterprise adoptions to enhance customer service, maximize sales, sharpen cybersecurity, optimize supply chains, free up workers from mundane tasks, improve existing products and point the way to new products. It is hard to think of an area in the enterprise where AI the simulation of human processes by machines, especially computer systems will not have an impact. Within the financial services industry, AI adoptions include algorithmic trading, portfolio composition and optimization, model validation, back testing, robo-advising, virtual customer assistants, market impact analysis, regulatory compliance and stress testing. In this work, discussion is on three specific areas in which AI is currently changing the financial services industry, namely (1) fraud detection and compliance; (2) personalized banking services and (3) credit risk management.

One crucial area in which machine learning can make a tremendous impact is fraud prevention. By fraud, it is understood as any fraudulent activity, such as credit card fraud, money laundering, etc. The former has been growing exponentially in recent years due to the increased popularity of e-commerce, the number of online transactions, and third-party integrations. In the past, organizations used to fight fraud with sets of hardcoded rules designed by domain experts. However, the potential danger lies in the fraudsters discovering the rules and then being able to

exploit the system. That is not the case for AI-based solutions, which can evolve over time and adapt to new patterns found in the data. There are many machine learning algorithms that specialize in anomaly detection and excel at spotting fraudulent transactions. Such an algorithm can sift through thousands of transaction-related features (the client's past behaviour, location, spending patterns, and trigger a warning when something seems out of order (Eryk, 2020).

AIs also support enhanced customer experience. Based on past interactions, AI develops a better understanding of customers and their behaviour. This enables banks to customize financial products and services by adding personalized features and intuitive interactions to deliver meaningful customer engagement and build strong relationships with its customer.

Statement of the Problem

Nigerian banking services are increasingly adopting AI technologies in their operations. Adoption of AI technologies is mostly out of upgrades to facilities and machines used in operations by manufactures. This in effect, is an innovative system born out of changes in product design. However, commercial banks in Nigeria need to give more thought to integrating AI technologies into their operations in a scale that revolutionizes operations. This is not the case right now for commercial banks in Nigeria. Ad-hoc changes to operations by reason of product changes will not bring about a cultural nor organizational change, the kind that supports the disruptive power of AIs and other emerging technologies. There must be a systematic process of integrating AI into the banking sector in Nigeria. Such holistic changes are yet to be seen. AIs have more adoptions in banks than applied by commercial banks in Nigeria.

Purpose of the Study

The purpose of the study is to ascertain experts' opinion on the integration of artificial intelligence adoptions for financial process innovation by commercial banks in Nigeria. Specifically, the study sought to ascertain

1. How the adoption of artificial intelligence (AI) in fraud detection promote financial process innovation by commercial banks in Nigeria.
2. How the adoption of artificial intelligence (AI) in personalized banking experience promote financial process innovation by commercial banks in Nigeria.

Research Questions

The following research questions were stated for the study

1. How does the adoption of artificial intelligence (AI) in fraud detection promote Financial process innovation by commercial banks in Nigeria?
2. How does the adoption of artificial intelligence (AI) in Personalized banking experience promote financial process innovation by commercial banks in Nigeria?

Research Hypotheses

The following null hypotheses guided for the study

Ho_1: Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption of artificial intelligence (AI) in fraud detection for promoting financial process innovation by commercial banks in Nigeria.

Ho_2: Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption of artificial intelligence (AI) in personalized banking experience for promoting financial process innovation by commercial banks in Nigeria.

Conceptual Review

Artificial Intelligence (AI),

Artificial Intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience. As the sophistication of artificial intelligence and intelligent algorithm technologies has increased, they now have the potential to revolutionize traditional banking models and deliver a shift to digital banking which is faster, more agile, and more customer centric. AI has the potential to transform all aspects of banking – from the way we save to the way we invest and spend – making possible a model of banking that is smarter, faster and more customer friendly (Franck, 2021).

Anjum (2020) averred that harnessing cognitive technology with Artificial Intelligence (AI) brings the advantage of digitization to banks and helps them meet the competition posed by current trends. In fact, about 32% of financial service providers are already using AI technologies like Predictive Analytics, Voice Recognition, among others. Artificial Intelligence is the future of banking as it brings the power of advanced data analytics to combat fraudulent transactions and improve compliance. AI algorithm accomplishes anti-money laundering activities in few seconds, which otherwise take hours and days. AI also enhances data mining and warehousing at a very high speed. Features such as AI bots, digital payment advisers and biometric fraud detection mechanisms lead to higher quality of services to a wider customer base. All this translates to increased revenue, reduced costs and boost in profits (Anjum, 2020).

Artificial Intelligence and Fraud Detection for Financial Innovation

As e-commerce has become more widespread, online fraud has also increased. According to the FCA, UK banks spend £5 billion a year in combating financial crime. Action Fraud reports that between 2015 and 2016 there was a 66% increase in the number of reported cases of payments-related fraud in the UK. US banks spend over $70 billion on compliance each year. Many large banks have had massive fines imposed upon them for failing to stop illegal financing, and as a result, many banks have turned to AI techniques to improve their operations (Bonnie, 2019). AI is beneficial here because it can analyse millions of data points to detect fraudulent transactions that would tend to go unnoticed by humans. At the same time it helps

improve the precision of real-time approvals and reduces the number of false rejections. Fraud detection now involves more than a checklist of risk factors (Bonnie,2019).

Artificial Intelligence and Personalized Banking Experience for Financial Innovation

Based on past interactions, AI develops a better understanding of customers and their behaviour. This enables banks to customize financial products and services by adding personalized features and intuitive interactions to deliver meaningful customer engagement and build strong relationships with its customer.

As part of this post financial crisis response, robo-advisors and chatbots are emerging across the financial services sector, helping consumers choose investments, banking products and insurance policies. A "bot" is a software adoption created to automate certain tasks using AI technology (Future Today Institute, 2017). A robo-advisor is an algorithm based digital platform that offers automated financial advice or investment management services.

The term "robo-advisor" was essentially unheard-of a decade ago, but it is now relatively commonplace in the financial landscape. However, the term is misleading and doesn't involve robots at all. Instead, robo-advisors are algorithms built to calibrate a financial portfolio to the user's goals and risk tolerance. Chatbots and robo-advisors powered by natural language processing (NLP) and machine learning (ML) algorithms have become powerful tools with which to provide a personalized, conversational and natural experience to users in different domains.

Financial innovation is the act of creating new financial instruments as well as new financial technologies, institutions, and markets. New technologies have enabled banks, insurers and other financial services firms to overhaul their operations and identify different ways of serving their clients. Over recent decades, innovative products have transformed the financial services industry – from payment types including credit and debit cards, to transaction processing such as telephone and online banking, to saving options such as investment funds and structured products, to e-commerce for financial assets, to risk management techniques, and beyond. Financial services firms must embrace the opportunities offered by innovation and further integrate disruptive technologies, such as artificial intelligence (AI), advanced analytics, robotics, the cloud and blockchain, to enable new services and capabilities.

Review of Related Empirical Studies

Manju (2019) investigated artificial intelligence in finance, understanding how automation and machine learning is transforming the financial industry. The main aim of this study was to examine the influence of artificial intelligence on modern world, especially in the field of finance. This research focuses on adoption of artificial intelligence, its challenges, opportunities and its impact on jobs and functions. The research applied qualitative and quantitative research designs. This study found out that many financial sectors have been benefiting greatly by implementing different artificial intelligence adoptions. The study found AI useful in fraud detection, credit scoring and robadvisers

Alshantti and Rasheed (2021) researched self-organising map based framework for investigating accounts suspected of money laundering. They developed an AI system for fraud detection. The results indicate that our framework is well capable of identifying suspicious accounts already investigated by our partner bank, using both proposed investigation

strategies. We further validate our model by analyzing the performance when modifying different parameters in our dataset.

Nekesa and Olweny (2018) investigated effect of financial innovation on financial performance: a case study of deposit-taking savings and credit cooperative societies in kajiado county. It was established that product, process and organizational innovations are the critical factors that influence the performance of the financial status of deposit-taking SACCOs in Kajiado County. The study recommends that SACCOs require qualified and experienced employees who are capable of meeting new challenges of competition particularly from banks and the government should enact legislations which will protect members' savings and promote prudential supervision of the industry.

Research Methodology

The study was conducted in Uyo, Akwa Ibom State, Nigeria. The design of the study was quantitative, employing the survey research design for the study. The population is 174 respondents, comprising of 28 accounting lecturers in public universities in Akwa Ibom State and bank managers, operational staff and key personnel in commercial banks operating in Akwa Ibom State, Nigeria. The sample size is 143, comprising of lecturers, bank managers, operational staff and key personnel in commercial banks operating in Uyo, Akwa Ibom State. The research instrument used for the study is a researcher- developed questionnaire tagged "Artificial Intelligence Adoptions for Financial Process Innovation Questionnaire" (AIAFPIQ). Section A of the instrument elicited information on the demographic data of the respondents and Section B sought the opinion of respondents on issues based on the objectives of the study. All items in Section B was structured using four-point rating scale of Strongly Agree (SA), Agreed (A), Disagree (D) and Strongly Disagreed (SD). The instrument developed by the researcher was face validated by three experts in the Department of Business Education, University of Uyo, Akwa Ibom State. All corrections and inputs were built in to the final version of the instrument. The test retest method was used to determine the reliability of the instrument. The instrument was administered to 30 persons who were not part of the sample but part of the study population. The result was then coded for testing using Cronbach Alpha technique. The reliability index yielded 0.89. On the basis of the high reliability index, the instrument was deemed suitable to be used in conducting the study. The data generated was analyzed using Mean, standard deviation and t-test Analysis. The Mean and standard deviation was used to answer all the research questions while t-test was used in testing the research hypotheses at .05 level of significance.

Presentation of Results and Discussion of Findings

Research Question 1: How does the adoption of artificial intelligence (AI) in fraud detection promote financial process innovation by commercial banks in Nigeria?

Table 1: Summary of Mean of Respondents on adoption of artificial intelligence (AI) in fraud detection

S/N	AI for fraud detection by commercial banks	$\bar{x}$	SD	Remarks
1	AI algorithms can analyse millions of data points to detect fraudulent transactions that would tend to go unnoticed by humans	3.76	0.48	SA
2	AI fraud detection systems can now actively learn and calibrate in response to new potential (or real) security threats.	3.71	0.55	SA
3	Using AI, banks' systems can detect unique activities or behaviours ("anomalies") and flag them for investigation.	3.55	0.58	SA
4	Quality control and quality assurance	3.63	0.91	SA
5	Cyber security	3.53	0.72	SA
6	Big data analysis	3.73	0.78	SA
7	Near instantaneous decisions	3.94	0.24	SA
8	AIs are equipped with monitoring systems, or workflow engines, that are trained on historical payments data.	3.63	0.71	SA
9	Early warning systems	3.65	1.2	SA

Table 1 shows the item analysis of the adoption of artificial intelligence (AI) in fraud detection. The Table identifies 9 ways AI can be used for fraud detection and all the items have mean reponses above 3.0, indicating Strongly Agreed by all the experts. The result shows that AI can be applied for fraud detection by analysing millions of data points to detect fraudulent transactions that would tend to go unnoticed by humans, AI fraud detection systems can now actively learn and calibrate in response to new potential (or real) security threats AI provides cybersecurity and can make near instantaneous decisions. These are all essential to promote financial process innovation by commercial banks in Nigeria.

Research Question 2: How does the adoption of artificial intelligence (AI) in Personalized banking experience promote financial process innovation by commercial banks in Nigeria?

Table 2: Summary of Mean of Respondents on adoption of artificial intelligence (AI) in Personalized banking experience

S/N	AI for personalized banking experience	$\bar{X}$	SD	Remarks
1	Image recognition	3.65	0.84	SA
2	Speech recognition	3.28	0.92	SA
3	Chatbot	3.97	1.19	SA
4	Natural language generation	3.78	1.06	SA
5	Sentiment analysis	3.55	1.03	SA
6	Virtual financial assistants	3.82	0.95	SA

Table 2 shows the item analysis of how the AI can be applied in personalized banking experience. The study identified 6 ways of applying AI for personalized banking experiences. Table 2 shows that all the items have Mean responses above 3.5, indicating strongly agreed. Thus, all the items were taken as being ways and means of adoption of artificial intelligence (AI) in Personalized banking experience in promoting financial process innovation by commercial banks in Nigeria. This included image recognition, speech recognition, chatbot, Natural language generation and sentiment analysis.

Ho_1: Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption of artificial intelligence (AI) in fraud detection for promoting financial process innovation by commercial banks in Nigeria.

Table 3: Summary of t-test analysis for expert responses on adoption of artificial intelligence (AI) in fraud detection promotes financial process innovation by commercial banks in Nigeria.

Group	N	Mean	Std. Dev.	df	tcal	tcrit.	Decision
Bankers	108	3.54	0.90	141	.273	1.96	Reject Ho
Lecturers	35	3.49	1.15				

Table 3 gives the summary of the t-test analysis for expert responses on adoption of artificial intelligence (AI) in fraud detection in promoting financial process innovation by commercial banks in Nigeria. The calculated t-value (t-cal) is 0.273. At 141 degree of freedom and .05 alpha level, the critical t value (t-crit) is 1.96. Since the t-cal is less than the t-crit, the null hypothesis is accepted. Thus, Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption of artificial intelligence (AI) in fraud detection in promoting financial process innovation by commercial banks in Nigeria.

Ho_2: Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption of artificial intelligence (AI) in Personalized banking experience for promoting financial process innovation by commercial banks in Nigeria.

Table 4: Summary of t-test analysis for expert responses on adoption of artificial intelligence (AI) in Personalized banking experience in promoting financial process innovation by commercial banks in Nigeria

Group	N	Mean	Std. Dev.	df	tcal	tcrit.	Decision
Bankers	108	3.83	0.50	141	.906	1.96	Reject Ho
Lecturers	35	3.91	0.28				

Table 4 gives the summary of the t-test analysis for expert responses on adoption of artificial intelligence (AI) in Personalized banking experience in promoting financial process innovation by commercial banks in Nigeria. The calculated t-value (t-cal) is 0. 906. at 141 degree of freedom and .05 alpha level, the critical t value (t-crit) is 1.96. Since the t-cal is less than the tcrit, the null hypothesis is accepted. Thus, Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption of artificial intelligence (AI) in Personalized banking experience in promoting financial process innovation by commercial banks in Nigeria.

Discussion of Findings

Adoption of Artificial Intelligence (AI) In Fraud Detection in Promoting Financial Process Innovation by Commercial Banks

The findings of the study shows that respondents strongly agreed that artificial intelligence (AI) can be applied in fraud detection by commercial banks in Nigeria. The result shows that AI can be applied for fraud detection by analysing millions of data points to detect fraudulent transactions that would tend to go unnoticed by humans, AI fraud detection systems can now actively learn and calibrate in response to new potential (or real) security threats AI provides cybersecurity and can make near instantaneous decisions. These are all essential to promote financial process innovation by commercial banks in Nigeria. The hypothesis test shows that Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption artificial intelligence (AI) in fraud detection in promoting financial process innovation by commercial banks in Nigeria. This finding is in line with Alshantti and Rasheed (2021) who researched self-organising map based framework for investigating accounts suspected of money laundering. They developed an AI system for fraud detection. The study found AI useful in fraud detection.

Adoption of Artificial Intelligence (AI) In Personalized banking experience for Promoting Financial Process Innovation by Commercial Banks

The findings of the study shows that respondents strongly agreed on the adoption of AI for personalised banking experience. The study identified 6 ways of applying AI for personalized banking experiences. Table 2 shows that all the items have Mean responses above 3.5, indicating strongly agreed. Thus, all the items were taken as being ways and means of adoption artificial intelligence (AI) in Personalized banking experience in promoting financial process innovation by commercial banks in Nigeria. This included image recognition, speech recognition, chatbot, Natural language generation and sentiment analysis. The hypothesis test shows that Experts (Bankers and Accounting Lecturers) do not differ significantly on their responses on adoption artificial intelligence (AI) in Personalized banking experience in promoting financial process innovation by commercial banks in Nigeria. This finding is corroborated by Nekesa and

Olweny (2018) who investigated effect of financial innovation on financial performance. They found AI and other innovations as enriching the customer experience and making customer service more flexible while extending more services to the customers.

Conclusion

The introduction of AI into financial services is one of the most current trends in global financial institutions. It is concluded that AI could be applied by commercial banks in Nigeria for fraud detection and enhancing customer and other financial services.

Recommendations

The following recommendations are made.

1. AIs should be systematically implemented by banks not just as a form of competition but as an overall business strategy to improve efficiency, productivity and general services optimization.
2. As the global financial world adopts AIs for financial services, banks in Nigeria should follow along the same lines for seamless transition into the digital age.

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