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The role of artificial intelligence and machine learning in enhancing customer experience in Nigeria digital banks

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ABSTRACT

The banking industry is crucial for economic growth and stability, with Nigerian banks playing a significant role in the country's economic system. The banking sector has evolved significantly, especially with the emergence of digital banking, driven by technological advancements like smartphones and the Internet. Digital banking offers benefits such as convenience, accessibility, cost savings, improved service quality, and competitiveness.

Customer experience and service quality are essential in banking, with customer satisfaction determining the success of banks. Segmentation of customers and understanding consumer behavior helps in providing effective services. Customer relationship management (CRM) is vital for retaining existing customers, attracting new ones, and upgrading services to meet customer needs. Machine learning (ML) and artificial intelligence (AI) have revolutionized digital banking, offering numerous benefits such as fraud detection, real-time transaction monitoring, personalized recommendations, customer behavior analysis, risk reduction, cost savings, improved decision-making, and enhanced customer experience. AI-powered chatbots and virtual assistants provide 24/7 assistance, reducing wait times and improving customer satisfaction. These technologies also help in mitigating biases in credit scoring, promoting fairness and equal access to financial services.

Overall, AI and ML have transformed the banking industry, leading to improved operations, customer service, risk management, and profitability while offering a more inclusive and personalized banking experience.

Keywords: Banking industry, Nigerian banks, Financial system, Digital banking, Technological advancements, Customer experience, Customer relationship management (CRM), Machine learning (ML), Artificial intelligence (AI), Inclusive banking, Technological innovation

1.0 INTRODUCTION

Banking is a kind of exceptional industry that works with capital to multiply money regardless of risk (Ghodselahe & Amirmadhi, 2011)^[4]. Banking institutions have a significant impact on a country's economy (Park, 2012)^[15] and also on a country's financial stability and sustainable development (Gutierrez et al., 2010)^[6]. The Nigerian financial system is active and dynamic and highly regulated to ensure that financial institutions are healthy, public confidence is enhanced and depositors' funds are protected. The rapid growth of information and communications technology (ICT) has made it important to adapt to global trends through technological innovation and dynamically improve information technology delivery strategies. The Nigerian banking sector has recorded tremendous growth in terms of improved service delivery, total asset base, deposit base and volume of loans and advances, especially since its deregulation, which is considered as the beginning of digitalization in Nigerian banking (Olannye, Dedekuma & Ndugbe, 2017)^[13].

The banking sector has undergone significant changes in the last few years and one of the notable changes is the emergence of digital banking. Digital banking is the use of technology to offer financial services to customers without requiring a physical presence in the bank to conduct financial transactions. This has made it possible to obtain financial services since the introduction of smartphones and

the Internet. This shift to digital banking has undoubtedly brought benefits to the masses, particularly in terms of convenience, accessibility and cost savings. Digital banking refers to the use of automated delivery mechanisms when providing services. Bataev and Plotnikova (2019) explained digital banking as the use of sophisticated technology in providing banking products/services to satisfy customer needs through the various channels^[1]. Therefore, it has transformed the products, services and processes of traditional banking, which has contributed to improving service quality, competitiveness and reducing operating costs. Banks are striving to engage in the highly competitive IT era, either out of necessity or to strategically lead the market. Enoruwa et. al. (2019)^[3] noted that digital banking has emerged as a strategic resource to achieve greater efficiency, control operations, increase the variety of financial services and reduce costs by replacing paper-based and labor-intensive methods with automated processes, resulting in higher productivity and Profitability leads.

Nigeria has been named the African leader in digital payments and the country's banking sector is also the most digitalized on the continent. According to a 2022 press release,^[8] Nigeria recorded 3.7 billion real-time payments in 2021, ranking it sixth among the countries with the largest real-time payments markets. Until the early 2000s, financial institutions relied on manual processes and paperwork to facilitate local and international transactions, no matter how complex. Nigeria's digital banking sector is expected to witness unprecedented growth in the coming years as the government increases efforts to develop the country's technological infrastructure^[5].

Customer Experience and Service Quality

Customers are fascinated to avail newly launched products and services from banks to complete banking transactions quickly (Laketa et al., 2015).^[11] The quality of service provided to customers is used to determine the bank's success and determine the bank's differentiation from its competitors. Customer satisfaction, which determines the survival and success of the organization in the competitive environment, is an essential indicator for evaluating the performance of the organization, especially the retail banking business which relies on customer loyalty to run its business profitably by attracting new customers existing customers (Dahari et al., 2015)^[2]. Despite banks' greater efforts, most customers are not satisfied with banks' banking services. Due to growing competition in the banking sector, banks have taken steps to improve their service quality according to customer demand and intensify service in a reliable manner (Johnston, 1997).^[10] Providing an excellent customer experience is critical to standing out in any industry, and the banking industry is no different. While the majority of banks recognize the importance of customer experience, only 20% of them are actively working to improve it^[7].

Nowadays, companies should segment their customers to provide them the best service according to their different needs, which helps in treating each customer effectively. Consumer behavior should be monitored to understand consumers well (Samala & Satheesh, 2020) and serve them better^[20]. The customer relationship management methodology connects marketing strategy with processes; Functions carried out within the company and network connections outside the company are developed to retain the existing customers in the highly competitive market by identifying and understanding their needs. Banking institutions can effectively use customer relationship management to better serve their customers if they focus on retaining existing customers, attracting new customers, motivating customers to cooperate closely with the bank, and upgrading customers to the banks' new services (Laketa et al., 2015).^[11] Furthermore, the banking industry can receive more deposits from depositors if it handles them properly (Puri & Rocholl, 2008)^[17]

2.0 MACHINE LEARNING (ML) AND ARTIFICIAL INTELLIGENCE (AI) IN DIGITAL BANKING

Huge advances in computer hardware, software and Internet technologies have irreversibly changed our societies. It is now difficult to imagine an economic actor without a computer, internet or mobile devices. The speed at which information technology (IT) is evolving offers great opportunities to expand the customer base, introduce new products or improve existing ones, and increase efficiency in a relatively short period of time. Among the various IT breakthroughs in recent years, the progress in AI is particularly notable. In short, AI refers to computers that have similar cognitive abilities to humans, which could lead to huge efficiencies for companies and their customers (Orçun Kaya 2019)^[14]. The financial sector was one of the first to experiment with AI technologies, not least because of their likely contribution to greater profitability. A massive shift towards online platforms has led to demands for a more satisfying user interface. With these modern technological changes, artificial intelligence and machine learning are becoming increasingly important in banking and financial services as banking institutions now understand the importance of automation in crucial operations. Approximately 85% of top industry decision makers believe that AI in banking will add meaning and benefits to their business processes in the coming days^[18].

Artificial Intelligence

Artificial intelligence refers to the ability of computer programs to acquire and apply knowledge without human intervention and intervention (Orçun Kaya 2019). By observing the world around them and analyzing information autonomously. Artificial intelligence is an innovative and dynamic technology that has the potential to significantly impact the banking and finance industry. AI encompasses a range of techniques that enable machines to simulate human intelligence and perform tasks with remarkable precision.

AI in banking and finance offers a wide range of opportunities for process optimization, risk management and customer loyalty. One of the key areas where AI is proving its potential is data analysis^[21]. With their ability to process large amounts of structured and unstructured data, AI algorithms can detect patterns, trends, and anomalies that may go unnoticed by human analysts. This data-driven approach improves decision-making and enables banks and financial institutions to identify potential risks, predict market trends and

optimize investment strategies. AI also plays a crucial role in customer loyalty. By leveraging natural language processing and machine learning, AI-powered chatbots and virtual assistants can interact with customers and provide them with personalized assistance and support. These intelligent systems can handle routine requests, process transactions and offer tailored recommendations, ultimately improving the customer experience and increasing satisfaction^[19].

Additionally, AI can potentially improve security and fraud detection in the banking and finance industry. AI algorithms can analyze massive amounts of data in real-time to identify suspicious activity and potential fraud patterns. This proactive approach helps prevent financial losses and protects both customers and institutions. By integrating AI, banking and financial institutions can remain competitive in an increasingly digital and data-driven landscape while providing value to their customers.

Conversational AI in the Banking and Financial Services Industry

Conversational AI in the banking and financial services industry includes technologies such as chatbots and virtual agents that allow users to participate in conversations.^[12] These technologies use rich data, machine learning, and natural language processing to mimic human interactions. They can understand both spoken and written input, decipher meaning and communicate in multiple languages. This technology enables banks and financial institutions to provide a more personalized and convenient customer experience, streamline various banking processes and improve customer engagement across multiple channels, including websites, mobile apps, messaging platforms and even voice-activated devices.

Conversational AI Offers a Significant Advantage by Providing 24/7 Assistance.

Whether it's answering questions about account balances, assisting with money transfers, or offering financial advice, these AI-powered systems are ready to use right away without customers having to wait in line or worry about business hours. This creates a more meaningful and hassle-free experience for customers and promotes higher customer satisfaction and loyalty. A conversational AI chatbot is built on five essential components that work together to enable computers to engage in human-like conversations. These components include:

1. Natural Language Processing (NLP): It enables computer systems to sense and respond to human language in a way that feels intuitive to customers. This includes understanding word meanings and sentence structures, as well as the ability to adapt to idiomatic expressions and colloquialisms commonly used in banking conversations.

2. Text analysis: During text analysis, meaningful information is extracted from text data, sentences are broken down into their components (e.g. subjects, verbs, objects) and words (e.g. nouns, verbs, adjectives) are categorized. This practice helps to decipher sentence meanings and relationships between words and to recognize moods, whether positive or negative.

3. Computer Vision: Computers are equipped with the ability to interpret and understand digital images. This involves identifying objects present in images, determining their position and orientation, and understanding the overall context of these images by analyzing their content and the interrelationships between different objects in the image. Additionally, computer vision expands its ability to detect emotional cues conveyed by people's facial expressions in images.

4. Speech Recognition: It enables computers to understand human speech by performing several important tasks. This includes recognizing different sounds in spoken sentences, understanding the underlying grammatical structures and syntax, and converting spoken words into written text. Additionally, it plays an important role in decoding word meanings, inferring emotions from spoken expressions, and capturing the broader context of spoken conversations.

5. Machine Learning (ML): ML enables computers to acquire knowledge and gain insights from data without the need for explicit manual programming. Machine learning algorithms continually refine themselves as they encounter more data. In the context of conversational AI in the banking sector, machine learning plays a central role in training computers to recognize patterns in financial data and create models that simulate various banking processes and sometimes even mimic human thought processes.

There are various approaches to programming computers to mimic human decision-making. Decision trees, ranking or prioritization are among the more established solutions. A relatively new approach is machine learning (ML) (Orçun Kaya 2019)^[14]. ML is a subset of AI and refers to computer programs that recognize patterns and make predictions based on them. Typical examples are Internet platforms that recommend certain products or news to users who might like them based on previous preferences. By continually analyzing new data and scenarios, ML tools make adjustments to decision-making processes without being specifically programmed to do so. You are therefore able to learn from data. Subcategories of ML include deep learning and supervised, unsupervised, and reinforcement ML.

Applications of machine learning (ML) and artificial intelligence (AI) in the financial sector have become very popular recently. Their immense power has been leveraged in these institutions to provide business solutions for front-end and back-end processes to create efficiencies and improve customer experience. In recent times, we have seen how computational intelligence is the most valuable enabler to gain competitive advantage by leveraging their decision-making capabilities^[18]. With tremendous results, we see ML and AI taking the banking industry by storm right before our eyes. Undoubtedly, ML and AI have revolutionized the banking industry. This revolution

has dramatically improved the banking experience in many ways. Although most financial institutions are still grappling with the adoption of computational intelligence technologies, their application is sweeping the industry like wildfire.

Therefore, it is fair to say that the world's financial and banking services have undergone a paradigm shift thanks to machine learning (ML) and artificial intelligence (AI). The growth of fintech organizations in particular is playing a leading role in the transformation that is unfolding before our very eyes.

3.0 BENEFITS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN DIGITAL BANKING

AI is becoming increasingly popular in financial services, impacting the way financial institutions operate, interact with customers, and manage everyday transactions and currency regulations. AI's ability to process massive amounts of data, recognize patterns and make informed decisions has made it a crucial tool for banks and financial institutions. The banking and finance industry is data-driven, and AI can analyze massive amounts of data and provide insights that can help financial institutions make better decisions. There are many potential use cases for AI in banking and finance, including improving customer experience, improving back-office operations, detecting fraud, managing risk, and improving compliance. Additionally, AI can enable financial institutions to automate repetitive tasks, improve accuracy, and speed up processes, resulting in cost savings and greater efficiency. AI-powered chatbots and virtual assistants can support customers 24/7, reducing the need for human interactions. According to Business Insider, almost 80% of banks are aware of the potential benefits that AI brings to their sector, and banks are expected to benefit by deploying AI-powered solutions will save \$447 billion in banking by 2023^[9]. These numbers suggest that the banking and finance sector is rapidly integrating AI into its business operations.

Benefits of AI in the Banking and Finance Industry

AI is transforming the banking and financial services industry by offering numerous benefits that will help banks and financial institutions improve operations, improve customer experience, and increase profitability. Some of the key benefits of AI in banking and financial services are listed below.

Fraud Detection

Fraud is always a big problem for banks and financial institutions. Billions of naira are lost every year to fraudulent activities such as identity theft, debit card fraud and money laundering. Recently, AI has emerged as an effective tool to combat fraud. They use sophisticated techniques such as anomaly detection and predictive modeling to analyze transaction data for unusual patterns and predict potential fraudulent activity^[16]. AI algorithms can analyze large amounts of data in real time, allowing banks and financial institutions to detect suspicious activity and prevent losses. Improved understanding of fraud patterns enables machine learning models to detect suspicious activity, which in turn helps financial institutions identify and prevent fraudulent transactions faster, more accurately, and more effectively. This will reduce potential economic losses. Timely intervention saves costs and protects institutional assets and client funds.

Real-time Transaction Monitoring

From a transaction security perspective, AI algorithms excel at real-time pattern recognition and anomaly^[22]. They examine transaction data to identify patterns that may indicate fraudulent activity. For example, if multiple transactions occur quickly from different locations, this could be an attempt to use a stolen debit card. Similarly, AI algorithms monitor spending behavior and easily identify sudden increases in spending or purchases in unusual categories as potential red flags. Additionally, it analyzes the temporal aspects of transactions and assesses factors such as timing, frequency, and location to pinpoint suspicious activity.

Chatbots and Virtual Assistants

AI chatbots provide efficient first-level support by addressing routine customer inquiries and concerns. Instantly provide information about account balances, transaction history, and account details, freeing customer service agents to focus on more complex issues. Respond to customer inquiries almost instantly by analyzing customer data such as transaction history and spending patterns and providing personalized recommendations to your customers. Chatbots reduce wait times and contribute to a more positive customer experience. Moreover, these chatbots are available 24/7, so customers can get support and information anytime, even outside of normal business hours. This availability increases customer satisfaction and engagement.

Personalized Recommendations

AI plays a key role in providing personalized financial planning and recommendations. This is achieved by carefully analyzing your personal financial data such as your trading history, income, expenses, savings, and investment patterns. This data-driven approach enables AI to provide a comprehensive understanding of your customers' financial health. Once this information is obtained, the AI begins a dialogue with the customer and sets clear financial goals. These goals are tailored to a person's unique circumstances and aspirations, such as saving for a home, planning for retirement, or investing in education.

Additionally, AI performs a thorough risk assessment to determine how much investment risk a customer is willing to tolerate. These key insights help us make recommendations and ensure they match the client's risk tolerance. AI develops a personalized asset allocation strategy based on your specified goals and risk profile. AI-powered systems recommend tailored investment plans to optimize a customer's financial situation.

Customer Behavior Analysis

AI is essential for analyzing customer behavior in the banking and financial sector. First, we collect rich data from a variety of sources, including transaction records, account balances, customer demographics, and online interactions.

This information is consolidated into a consistent database, providing a comprehensive overview of each customer's financial profile. AI is good at identifying patterns and trends through advanced algorithms. Detects repetitive behavior such as: B. Regular bill payments, frequent online shopping, or avid savings behavior. Such pattern recognition allows AI to gain insight into an individual's financial habits and preferences. AI systems adapt and refine their insights and predictions as new data is generated. This dynamic process allows banks and financial institutions to anticipate customer needs, prevent fraud, and improve the customer experience.

Reducing Risk and Operating Costs

Although people enjoy the physical feel and human interaction of banking, there are also significant drawbacks. Manual errors are inevitable and can sometimes have serious consequences. Trained employees tend to make fewer manual errors, but even banks and financial institutions can face penalties and irreparable reputational damage. AI-based decision management systems, on the other hand, reduce this risk by incorporating logic streams into data collection and integrating predictive and prescriptive methods to solve business problems.

Improving the Customer Experience

Modern customers are always looking for comfort and convenience. For example, automated teller machines were successful because customers had access to comprehensive support even when banks and financial institutions were closed. This level of convenience will only lead to more innovation. Using AI in Financial Services, customers can now open a bank account from the comfort of their home via the web or their mobile device. Additionally, integrating AI allows customers to carry out lots of self service without going through any complicated steps.

Improved Decision-Making: AI's real-time data analysis allows banks to make informed decisions and optimize investment strategies and credit risk assessments. This reduces default risk, increases profitability and creates new opportunities. Securing financial data by leveraging the analytical capabilities of AI is essential to maintaining customer trust and protecting critical financial information.

Improved Risk Management: AI algorithms synthesize data from various sources such as customer behavior, market trends, and economic indicators. This multi-layered analysis allows banks and financial institutions to take preventive measures by identifying potential risks early. This significantly improves risk management, reduces the likelihood of default, and protects financial institutions' investments. This proactive attitude protects your assets and promotes a stronger and more secure financial position.

Lower Costs: AI-powered recommendations and targeted marketing campaigns allow banks to engage with customers more effectively. By personalizing services and benefits, banks can increase customer loyalty and reduce new customer acquisition costs. Additionally, AI-powered chatbots and virtual assistants optimize customer interactions and efficiently handle routine inquiries and transactions. This reduces reliance on human customer service agents and cashiers, reducing labor costs and increasing operational efficiency.

Bias Mitigation: AI actually provides a powerful solution to counter bias in credit scoring for banks and financial institutions. By using AI algorithms to analyze customer data, you can make credit decisions based solely on financial factors, reducing the impact of potential discriminatory factors such as race, gender, and age. This ensures that the credit scoring process is fair and impartial and promotes equal access to financial services for all.

Additionally, AI-driven systems continually learn and adapt, reducing the risk of perpetuating past biases and promoting a more inclusive and fair credit environment. AI can help banks and financial institutions align their credit assessment processes with principles of fairness and equal opportunity.

4.0 CONCLUSION

The banking industry holds a unique position in economic systems, acting as a catalyst for capital multiplication despite inherent risks. Nigerian banks, deeply integrated into the country's financial system, contribute significantly to economic growth and stability, ensuring public confidence and depositors' fund protection through stringent regulations.

The emergence of digital banking, fueled by technological advancements like smartphones and the Internet, marks a transformative era for the sector. Digital banking offers unparalleled benefits such as convenience, accessibility, cost savings, and improved service quality, driving competition and enhancing customer experience.

Customer experience and service quality are pivotal in banking, determining success and differentiation. Segmentation and understanding consumer behavior enable effective service delivery and customer retention strategies through customer relationship management (CRM).

The advent of machine learning (ML) and artificial intelligence (AI) revolutionizes digital banking, offering multifaceted advantages including fraud detection, personalized recommendations, risk reduction, and improved decision-making. AI-powered chatbots and virtual assistants ensure 24/7 customer support, reducing wait times and promoting fairness in credit scoring.

Nigeria stands as a digital banking leader in Africa, witnessing exponential growth in real-time payments and digitalization. Customer-centric approaches, aided by AI and ML, enhance operational efficiency, profitability, and customer satisfaction, propelling the banking sector into a dynamic and inclusive future.

In conclusion, AI and ML have reshaped the banking landscape, offering a plethora of benefits that transcend traditional banking boundaries, paving the way for a more efficient, secure, and customer-centric banking ecosystem.

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