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The role of Artificial Intelligence in identity technologies: A comprehensive analysis of the Nigerian fintech ecosystem

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Abstract

Identity technologies in Nigeria's fintech ecosystem are witnessing the palms of Artificial Intelligence (AI), making security more simplistic, more efficient and more open in the digital financial service. The paper offers a complete review of the AI based identity solutions which are used for fraud detection, customer authentication and regulatory compliance. The study uses structured literature review to understand the according role of machine learning, biometrics and blockchain in enhancing identity verification process. This shows that AI based identity technologies can help prevent fraud and reduce the time taken in KYC procedures and also improve financial inclusion. While challenges like data privacy concerns, regulatory inconsistencies and the risk of algorithmic biases, are still significant hurdles. Finally, the study argues that we need a balanced regulatory framework that enables ethical deployment of AI in the fintech sector but at the same time having the ability to promote this innovation. Also, it underlines the need for cross cooperation of financial institutions with technology service providers and policymakers improving trust and security of digital banking. Financial security and inclusion can be fully harnessed by Nigeria's fintech landscape when these challenges are addressed, which can be achieved through AI driven identity technologies. The paper ends with recommendations for improving policy, engaging stakeholders and future research direction to optimize AI's role in identity verification in Nigeria's evolving financial ecosystem.

Keywords: Artificial Intelligence (AI); Identity Verification; Financial Inclusion; Fintech Ecosystem; Data Privacy and Security

1. Introduction

The efficient distribution of capital, credit, savings, and investments depends upon the functioning of the financial sector; by ensuring such an environment, the financial sector plays a crucial role in mobilizing capital; the financial system helps to channel savings so that they can be productively applied; it also facilitates the allocation of credit in a rational and economically effective manner while participating in developing a business. Recently, financial service delivery has been given priority by both developed and developing nations for modernizing, using new technology to make financial inclusion more effective and efficient [1]. As financial technology (FM), Artificial Intelligence (AI) and Information and Communication Technology (ICT) in financial systems worldwide increase in their adoption, financial systems are being transformed towards providing cost effective, accessible and secured financial service provision.

The emergence of mobile and internet-based FinTech platforms, such as PayPal, Alipay, WeChat, M-Pesa, and Google Pay, has significantly impacted the evolution of the financial sector [2, 3, 4, 5, 6]. Financial transactions made possible

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by these platforms have made use of cash much less frequent and fast, inexpensive. In addition, mobile and internet banking, peer to peer lending, blockchain based transactions, and cryptocurrencies are redefining the traditional banking models through transparent, secure and flexible ways [7, 8, 9]. ICT infrastructure takes an important role in these developments as it gives these networks for digital financial transactions to allow connectedness and the financial access for marginalized populations [10, 11, 12, 13, 14, 15].

The technological innovations and increasing demand by consumers for a technologically competent FinTech ecosystem has spurred rapid development in Nigeria's FinTech ecosystem. Such growth is driven by the high adoption of smartphones, a growing youth population and a large unbanked segment of the population [16]. But along with this expansion have been challenges on identity verification, security threat and regulatory compliance. Today, many financial institutions continue to validate identities using laborious and expensive means, including the review of manual documents and biometric technologies, making them easy victims of cybercrime and fraud [17]. These challenges are telling us that the time has come for better, more secure identity solutions to support Nigeria's digital economy.

However, these issues can be solved with artificial intelligence, which offers automated identity verification systems that can process a large dataset, detect the fraud patterns, and increase the financial security [18]. AI driven identity verification improves customer experience, decreases the time to onboard, as well as minimizes the risk of fraud in remote areas where traditional identification is not possible [19]. Secondly, government initiatives such as the Bank Verification Number (BVN) and National Identity Management Commission (NIMC) confirm Nigeria's position as a country that has embraced digital financial inclusion and transformation (CBN, 2020). Nevertheless, existing identity management systems suffer from gradually enrolling and verifying which requires AI based solutions to scale and be efficient [22].

However, despite its potential, implementation of AI in identity verification in Nigeria's financial sector is hindered by concerns of data privacy, regulatory uncertainties and the high cost of adoption of AI [22]. Barriers include poor infrastructure, lack of skilled personnel, as well as lack of awareness about the benefits of AI [23]. These challenges make this study attempt to examine the role of AI in identity technologies included in Nigeria's FinTech ecosystem in terms of its contribution to financial security, fraud prevention, and accessibility. By laying the foundation for ongoing discussions on AI's potential to enhance the financial services while managing risks associated with it, these findings will be useful. Due to this, it examines the ways in which AI based identity technologies reframe whether financial inclusion, risk management, and customer onboarding are possible in Nigeria's fintech ecosystem. Although we are improving efficiency and security, there are challenges such as data privacy, regulatory concerns, bias, to mention a few. Financial access in remote areas is limited by the traditional verification methods which are slow and costly. AI can deliver scalable solutions, but such actions are prone to recreating financial exclusion if not done carefully if poorly rolled out. It is important in assessing the benefits and risks of AI in shaping the direction of policy and fintech stakeholders towards best practices in securing and inclusive digital finance in Nigeria, in ensuring technological advancements are in line with ethical and regulatory standards.

1.1. Research Objectives

- Analyze the current state of AI-driven identity verification technologies in Nigerian fintech
- Evaluate the impact of machine learning algorithms on fraud prevention and customer authentication
- Assess the socio-economic implications of AI-enhanced digital identity solutions

2. Literature Review

The advent of FinTech has revolutionized the world of finance by introducing revolutionary business models aimed towards improving efficiency, accessibility and affordability. The rise of digital financial platforms has challenged traditional banking institutions since these platforms offer consumers the possibility of seamless and real time transaction processing at a cost-effective price [2,3,4]. Mobile banking, peer to peer lending and blockchain enabled transactions are some of the key disruptors which offer financial services that circumvent the constraint of conventional banking [7,8,9]. More specifically, these developments have been very transformative in emerging economies, where for long the lack of banking infrastructure has traditionally curtailed financial access [23,24,25]. As the need for mobile network becomes more essential, the financial inclusion scales up and decreases the cost of traditional banking as well as the transaction efficiency. However, mobile payment solutions such as M-Pesa has highlighted the possibility of digital finance combining to decrease cash dependency and participation in the economy through economic participation, especially in under serviced regions [10,11,12,13,15]. Despite this, these technologies bring about many benefits but also introduce security risks of fraud, money laundering, and unauthorized transactions [26,27]. Identity

verification is still a major issue in financial transactions in Nigeria. Many of the population is unidentifiable, which makes traditional verification processes cumbersome and exclusionary. Although current methods such as biometric verification and document-based assurance checks tend to be unreliable, expensive and time consuming [17]. Blockchain-based approaches, as explored by Bello et al. (2025) [28], demonstrate how decentralized identity verification using smart contracts can enhance onboarding efficiency and reduce compliance burdens for financial institutions. Additionally, verification processes are further complicated by the lack of a centralized, reliable identity database which slows down financial transactions and increases costs for doing business of FinTech companies [21]

BVN and NIMC are among government's initiatives in addressing these challenges. While these systems have enhanced identity authentication, they have not been able to cover significantly, nor be efficient, as often they are plagued by delays and technical challenges [20,21]. Therefore, it is necessary that more advanced solutions like AI driven identity verification, improve accuracy, and scalability and further to include fraud detection capability. Financial identity verification made possible by artificial intelligence can be a real time, automated process. Machine learning algorithms and AI powered systems have the capacity to analyze wholesale lots of data, safety anomalies, fraud prevention, etc.[18]. These capabilities are especially useful in Nigeria's FinTech sector where financial institutions want less costly and more scalable solutions to onboard and secure customers [19]. In addition, AI driven identity verification helps in regulatory compliance in that transactions follow the anti-money laundering (AML), and know your customer (KYC) regulations. Automated identity checks allow decreasing human errors, and improving operational efficiency, increasing customer trust to digital financial services [22]. Nevertheless, attempts at AI adoption in Nigeria are restrained by data privacy issues, lack of clear regulations and the high cost of implementation [29]. To overcome these challenges, it will take concerted efforts of the government, the financial institutions, and technology providers in setting up an enabling regulatory regime for AI backed innovation and protection of consumers respectively.

2.1. Theoretical Framework

Two theories were found to be applicable to the study. These theories include Technology Acceptance Model (TAM), and Institutional Trust Framework.

2.1.1. Technology Acceptance Model (TAM)

This model is one of the most used models on the use and acceptance of technology in research. The model developed by Davis (1989) [30] explores the acceptance of new technology or new services [31]. The model explains the relationship between user's beliefs about the use of technology as well as their intention and attitude towards the use of technology. Perceived usefulness (PU) has demonstrated a more robust link with technology utilization than other factors in prior models. Thus, the researcher integrates both perceived usefulness (PU) and perceived ease of use (PEOU) into its application in the use of AI identification technology in the fintech sector. This goes to highlight how well this technologically driven innovation may be adopted, maybe due to the perceived sense of usefulness by the end users.

PU denotes the extent to which a user sees that utilizing a particular system will improve job performance, whereas PEOU signifies the level at which a user views a system as requiring minimal effort. The two components provide the essence of the Technology Acceptance Model (TAM) [31] a prominent paradigm for comprehending technology uptake.

The Technology Acceptance Model posits that a person's intention to utilize new technology is predominantly influenced by perceived usefulness and perceived ease of use. Companies that perceive AI identification technologies as one with bottlenecks or unbeneficial may hesitate to embrace them. If companies view AI technologies as simple to master and advantageous for cognitive enhancement, they are more inclined to interact with the technology.

Notwithstanding criticisms, the Technology Acceptance Model (TAM) continues to be a significant framework for analyzing determinants of technology adoption, especially in developing countries [32]. The underlying notions persist in guiding research on how perceived usefulness and ease of use influence Fintech companies' adoption of AI identification technologies.

2.1.2. Institutional Trust Framework

This theory explains the importance of confidence in the adoption of technology. It is important that the users. This theory seeks to explain organizational behaviors of both formal and informal institutions. The theory seeks to explain societal norms, values, rules, and regulations in influencing the actions of an organization, such as financial institutions [33,34].

Organizations modify their methods and structures to conform to societal standards, obtain approval, access resources, and cater to various the needs of different people in society. Scott's (2005) [35] expansion of institutional theory emphasizes the influence of institutions on the formation and operation of organizational structures. Scott highlighted that there are three major institutional pillars which include: regulative (laws and regulations), normative (values and norms), and cognitive (common beliefs and mental frameworks). This framework provides an in-depth comprehension of the impact of formal and informal structures on organizational behavior, in this case, the impact of factors on the adoption of AI Identification technology.

From the standpoint of institutional quality, the theory emphasizes how the robustness and efficacy of both formal and informal institutions influence organizational conduct, especially within financial institutions. Superior institutional quality, evidenced by robust legal frameworks, effective governance, and conducive regulatory environments, is essential for organizational success and stability. Effective governance, characterized by little corruption and strong regulatory frameworks, is essential for prosperous financial institutions [36]. Transparent and accountable institutions cultivate public trust, resulting in more efficient financial markets, improved resource allocation, and heightened capital inflows, all of which bolster financial development and stability. Robust institutions characterized by minimal corruption, efficient contract enforcement, and transparency are crucial for promoting financial sector expansion, facilitating innovation, and maintaining operational efficiency [37].

In recent years, institutional theory has examined the influence of technology on institutional transformation. Technological advances can destabilize conventional institutions and generate opportunities for transformation [38]. Financial innovations have resulted in the formation of novel institutional frameworks inside the financial ecosystem.

3. Methodology

3.1. Research Design

This study adopts a scoping review in order to get comprehensive information as regards the variable of the study. A scoping review allows for rigorous and methodical analysis to provide answers to proposed research questions using existing literature and findings from previous studies. This is executed to ensure that all accessible proof and information are presented honestly, providing scientific substantiation for future use [39] The researcher reviewed all pertinent studies related to the work. The study reviewed electronic databases majorly from AJOL and Googlescholar. This was utilised as the areas of the study was majorly Nigeria and these databases were closely related to databases where the studies could be found. These databases were chosen for their status as the foremost and most often employed resources for studies in Nigeria as suggested by [40].

The study adopted the PCC (Population/Concept/Context) framework. According to JBI's Scoping Review Manual, the 'PCC' mnemonic is advised as a framework for generating a clear and significant title for a scoping review. The PCC acronym represents Population, Concept, and Context. Explicit objectives, interventions, or phenomena of interest are not required to be articulated for a scoping review; yet aspects of each may be implicitly present in the notion being analyzed. The review lasted for two weeks as the researcher developed search terms with boolean's operator such as 'AND' and 'OR'. Terms such as (refer to Tables 1 and 2 below) were combined to facilitate an in-depth study of recent and relevant literature.

Database filters were created to locate publications that include the designated search phrases in their abstracts, titles, and full-text documents [41]. The researcher will meticulously analyze the abstracts of identified papers to become acquainted with the review.

Table 1 PCC Table

Population	Concept	Context
FinTech Companies Financial Banking	Artificial Intelligence Machine Learning Deep Learning	Identity Technology Identification Fraud detection

Source: Methley *et al.* (2014) [41] .

Using the PCC framework and Boolean operators, the following search terms were developed for the study as shown Artificial Intelligence" OR "Machine Learning" OR "AI") AND ("Identity Technologies" OR "Biometric Authentication" OR

"Digital Identity") AND ("Fintech" OR "Financial Technology" OR "Digital Banking") AND ("Nigeria" OR "Nigerian Economy"). ("AI Algorithms" OR "Neural Networks") AND ("Identity Verification" OR "Facial Recognition") AND ("Financial Inclusion" OR "Mobile Payments") AND ("Nigeria" OR "West Africa"). ("Artificial Intelligence" OR "Deep Learning") AND ("KYC" OR "eKYC" OR "Identity Management") AND ("Fintech Ecosystem" OR "Digital Finance") AND ("Nigeria" OR "Lagos").

The PRISMA flow diagram was then used for identifying, screening, and determining the eligibility and inclusion criteria for the reports that are within the scope of the review. The purpose of the PRISMA Statement is to assist writers in enhancing the documentation of systematic reviews and meta-analyses. While our primary emphasis has been on randomized trials, it is worth noting that PRISMA can also serve as a framework for presenting systematic reviews of various other forms of research, including assessments of therapies. PRISMA can be utilized for evaluating published systematic reviews, but it is not designed to assess the overall quality of a systematic review.

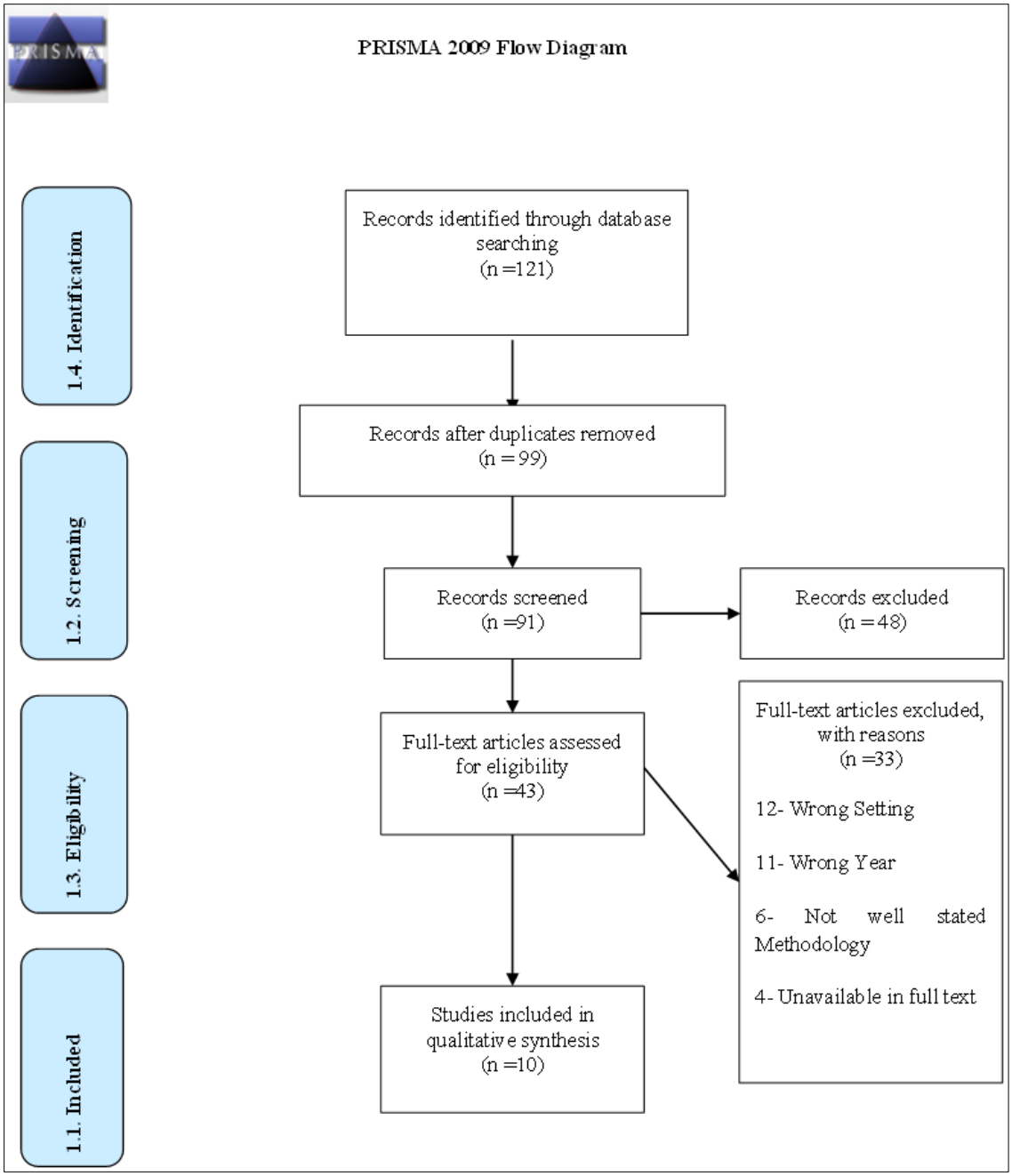

Figure 1 PRISMA 2009 Flow Diagram showing the selection process of studies included in the review

The inclusion and exclusion were also applied in the selection of included studies. The inclusion includes studies done within the last 5years as it relates to the recency of events, that is studies between 2019-2025, studies in Nigeria and those done in English Language as well as peer reviewed journals and those with full abstract available. Lastly, included studies include Studies involving financial institutions, fintech startups, regulatory bodies, or end-users (e.g., customers) in the Nigerian fintech ecosystem. Exclusion criteria include studies outside Nigeria, those not written in English, as well as those not involved in financial institutions. Studies who do not have their full articles available were also excluded from the study.

Quality assessment of the papers was done to ascertain the quality of the studies involved. The analysis was done using both narrative analysis and thematic analysis. The approach is inductive, as it develops concepts and theories from the facts, in contrast to the deductive methodology of content analysis. Ethical procedures were observed and the procedures speculated were strictly followed

4. Results and discussion

4.1. Analyze the Current State of AI-Driven Identity Verification Technologies in Nigerian FinTech

This analysis was done using narrative synthesis to analyse the current state of this technology in Nigeria. It was discovered that the understanding of AI technologies as a game changing factor in the Fintech industry cannot be over emphasised as long-standing issues like fraud, financial exclusion, and inefficient customer onboarding can be solved using AI-driven technology, especially in the area of identity verification. Studies agree that biometric authentication methods (such as fingerprint, face, and voice recognition) could tremendously improve security measures for identity verification [42,43]. In a country like Nigeria, where the National Identification Number (NIN) and other older forms of identification disproportionately affect women and people living in rural areas, these innovations find relevance. However, it was seen from the reviewed studies that the use of AI-driven identity verification is at an infant stage as stated by [44,45]. Although a number of banks and FinTech companies have started using AI-driven identity verification, there are still several obstacles to its broad adoption due to issues with regulation, infrastructure, and social and cultural norms, hence, showing a gap between potential and reality.

One of the highlighted potentials lies in the enhancement of security while improving financial inclusion. Ekolama et al. (2022) [45] study introduced 'Fraudaeck-AI', an artificial intelligence model aimed at identifying network intrusions and mitigating cyber fraud within Nigeria's banking sector by using Neural networks to analyse behavioural patterns, identifying suspicious activities and minimizing fraudulent transactions. In the same vein, [44] explained that AI is being used in real-time transaction monitoring and behavioral modeling, which can help identify customer behavioural patterns to decipher unusual behaviours that may be fraudulent. It was also explained that, although this is still very scanty in practice, there are beginning to be possibilities of the use of AI for Voice recognition and text-to-image applications facilitate participation in the digital economy for individuals with low literacy levels or restricted access to formal identification, hence breaking sociocultural barriers that bother on disparity [42, 43].

Different challenges were said to however impede successful implementation of AI-driven identity verification systems in Nigeria. Ogundele et al. (2025) [48] identify regulatory constraints as a significant challenge, observing that governmental policies many a times lag technological progress, and this causes a huge lag in innovation. Moreover, [43] and [42] highlighted infrastructural deficiencies, like restricted internet connectivity and high cost of biometric equipment, which constrain the dissemination of AI-driven solutions. Beyond this, there are also concerns that relates to data privacy and security in the Fintech AI space. Ekolama et al. (2022) [45] warn that AI systems are susceptible to cyber threats, including Xenomorph Trojan software, which can circumvent security measure, thereby destroying significant information. This poses a significant challenge regarding the acceptance of AI based identification system especially in the face of growing acceptance as regards technological usability, especially in an environment where public confidence in digital technology remains nascent.

Omotubora (2024) [43] and Agidi (2020) [42] highlighted that current technologies are not tailored to the specific requirements of women and other marginalized groups. This neglect sustains the marginalization of these populations, compromising the inclusive capacity of AI.

4.2. Evaluate the Impact of Machine Learning Algorithms on Fraud Prevention and Customer Authentication

This was analysed under the negative and the positive impacts, as literature suggests how well these technologies has helped improved identification as well as some inherent lapses that exists.

4.3. Positive Impacts

4.3.1. Enhanced Fraud Detection and Prevention

One advantage of AI-driven machine learning for identification is its capability to analyse large datasets in real-time to determine unusual patterns of behaviours that may predict fraudulent activities. Alemu (2024) [44] illustrates that AI may identify suspicious transactions through behavioral patterns, whereas [45] examine the Fraudaeck system, which attains a 93% accuracy rate in detecting fraudsters by monitoring network and banking application interactions. This shows the potential of ML models to forecast fraudulent activities thereby enhancing ways of aversion of those activities using previous data to identify potential threats. It was explained from the reviewed studies that this is a common pattern in Nigeria, where there exists a high propensity for fraudulent activities [43,44].

4.3.2. Improved Customer Authentication

Another breakthrough in the use of AI and ML in identification technology is in its ability to improve user authentication via advanced security protocols like Multi-Factor Authentication (MFA) and biometric verification. Studies show that it could offer a more secure user-friendly alternative for conventional passwords via biometric authentications like fingerprint scanning, facial recognition [43,43]. Ekolama et al., (2022) [45] explained that platforms like Fraudaeck evaluate biometric information and record legitimacy to understand the difference between fraudulent and authentic identities to improve protection against fraud. This tends to improve Biometric authentication especially for less educated areas who may not have the technical know-how as regards FinTech's [43]. Hence, improving the acceptability of these technologies as FinTech's are able to penetrate these areas helping to improve the acceptability of AI technology adoption to mitigate fraud risks and enhance identity verification [42]. The shift from password-based authentication to AI-driven biometric security underscores the growing importance of machine learning in improving financial security and promoting digital inclusivity. The integration of smart technologies such as AI and blockchain provides a more holistic approach to identity management, combining automation, transparency, and security (Bello et al., 2025) [28]

4.3.3. Negative Impacts

However, despite its several advantages, there seems to be some disadvantages posited by the integration of identification technology in the Fintech space in Nigeria.

4.3.4. Bias and Accuracy

AI inspired fraud protection and user identification still has the problem of bias in ML algorithm which may be due to lack of data versatility as this may marginalize certain demographic that make use of financial services [42,43]. Another issue relates to the potency of cyber threats even though many of these models are said to be highly accurate as shown in the works of [45], this then calls for consistent upgrade in the AI models used to encourage integrity as well as improvement in the integration of real time threat intelligence to control growing cyber risks.

4.3.5. Rules and Regulations

Ogundele et al. (2025) [46] explained that there seems to still be a lack of definite rules and regulations regarding AI identification technology. Lack of strict data protection may lead to lack of confidentiality of client information which fraudsters may exploit, eroding confidence in AI-driven security solutions. Despite these challenges, AI-driven fraud detection significantly outperforms traditional methods in terms of speed, adaptability, and accuracy. The 93% accuracy rate of Fraudaeck highlights how well machine learning algorithms detect fraudulent activity in advance. However, even if AI reduces false positives, false negatives can still occur, particularly if the training data is not varied. AI models may not detect fraudulent transactions, which could lead to possible financial losses, if they are unable to correctly represent different transaction types [44,45]. It is then important to improve regulations and rules around AI identification technologies and ensure consistent upgrades so as to improve efficiency and improve fraud detection prowess [42,46].

4.4. Assessing the Socio-Economic Implications of AI-Enhanced Digital Identity Solutions

4.4.1. Financial Inclusion

Secure and efficient Digital Identity solutions created with the help of AI make a vital contribution to increased financial inclusion by offering the secure and efficient way of verifying the identity. Digital identity systems are of particular importance in Nigeria where a significant population of the population remains unbanked or underbanked and through which these people can be brought into the formal financial system [44]. Typically, traditional banking infrastructures required physical documentation and in person verification, making it difficult for people in the remote or the underserved areas of a country to have access to finance. Identity verification tools powered by AI, that use biometric

authentication and automated processes, make it easier to get rid of these barriers by facilitating smooth and remote verification. Systems such as the Bank Verification Number (BVN) and the National Identification Number (NIN) have greatly enhanced access to the financial services in Nigeria. The systems enable the creation of verifiable identities which can be used across various banking and financial platforms to enable participation of those who were previously excluded from the system [45]. Additionally, AI driven verification solutions are overcoming socio-cultural obstacles by riding on a multi modal authentication (voice ID, fingerprint scanning and facial recognition [43,44]. These are advancements that make it possible for people who might otherwise be dependent on traditional literacy-based methods of identification, but that have a little bit of technological experience, to be included in the financial system. With such digital identity onboarding systems, AI makes the onboarding process much quicker and more convenient for financial services, especially for people in marginalized communities, the wait times are gone, and financial transactions are more available. This allows people that would otherwise be excluded due to geographical, technological and literacy constraints to gain access to banking, lending and other financial services. It includes more people in economic activity, enabling more people to save and invest, and gain access to credit, which results in a strengthened financial well-being for the more people as well as broad economic development.

4.4.2. Economic Growth and Stability

Similarly, AI based identity technologies also play their part in economic growth and stability with reduction in fraud, increase in trust in financial transactions and building investor confidence. Persistent friction of fraud and identity theft in the financial sector of Nigeria has deterred businesses and investors from transacting on large scales [45]. By joining forces with identity-verification via AI, financial institutions can significantly root out frauds from fraudulent activities, minimize financial crimes and protect consumer transactions. The improvement of this security not only increases confidence of the consumers but also enable Nigeria to be attractive to foreign investors who require stability and security of financial environment before they participate in economic partnerships. AI enhanced digital identity solutions also help companies create new jobs and boost their business growth by avoiding loss of money due to fraud. Businesses suffer in the relative losses due to fraudulent transactions and identity theft, which debilitate their capacity to hire more employees and carry on. AI based solutions mitigate these risks and thus businesses can keep more revenue, invest more in expansion and create more employment opportunities [44]. Additionally, the demand for skillful professionals that will help develop and maintain AI identity systems will, in turn, stimulate job creation in Nigeria's technology sector in artificial intelligence, cybersecurity, and digital finance. Also, invested AI infrastructure and workforce development are also dependent for long term economic growth. It is Nigeria's potential to use AI technologies for identity verification that would make the country competitive in the global digital economy. In order to ensure that AI-powered identity solutions will contribute positively to economic growth, government policies that facilitate AI education, research, and development of the infrastructure will be critical. These technologies, if properly adopted, can bring Nigeria to the top of the list of fintech innovators in Africa, which can enhance regional trade and economic integration.

4.4.3. Privacy and Security Concerns

While AI powered identity verification offers many benefits, there are serious privacy and security issues that must be tackled for AI powered identity verification to be ethical and responsible. Anarea of concern is the possibility that biometric data collection could be misused, as it serves as main ingredient for most of the AI based identication systems. With the growing reliance on biometrics that includes facial recognition and fingerprint scanning, unauthorized access to data, identity theft and government surveillance are real concerns [44,46]. Without proper data protection, cybercriminals can take advantage of sensitive personal information or institutions misuse the data for purposes other than its purpose of collection. All AI enhanced digital identity solutions have the role of making secure and efficient identity verification processes possible in the realm of financial inclusion. Digital identity systems are ways of integrating unbanked or underbanked persons in the formal financial system especially in Nigeria where a large proportion of the population is unbanked or underbanked [44]. Traditionally, people in remote or underserved areas have not been able to do this because traditional banking infrastructure always requires physical documentation and the presence of the people themselves. The barriers of these constraints are removed by using the AI powered identity verification tools that use biometric authentication and automated processes to create a seamless and remote verification [45]. This might lead to some populations not being able to access necessary financial services at par with others. Thus, increasing existing inequalities. At the same time, the use of AI in identity verification makes the data breach and unauthorized access to personal information more likely. Centralized and cloud-based databases that store customer identity records are heavily used by Fintech operations and are therefore vulnerable to cyber-attacks [45]. As data protection regulations in Nigeria continue to evolve, the need for stronger legal frameworks to protect consumers from identity theft and financial fraud in the country has never been felt before. One of the biggest issues is that the current policies like the Nigerian Data Protection Regulation (NDPR) may not cover the quick progressions in concepts of AI driven identity technology. To mitigate security risks, these regulations need to be strengthened and compliance

with them in fintech companies need to be tackled very well. There are also concerns about data sovereignty and control when multinational fintech firms operate in Nigeria. Some international technology companies have developed and continue to maintain many AI powered identity verification solutions which is an issue because we don't know where Nigerian consumer data is being stored and how it is used. Without the presence of data governance frameworks, the sensitive identity information of Nigerian consumers may be stored on foreign servers, thereby rendering them vulnerable to data privacy violations. To address these concerns, government, the stakeholders in the fintech space, and AI developers will have to team together to implement localized data storage solutions as well as strict policies of protection of the data.

5. Conclusion

The study draws attention to the great potential for change that AI powered identity verification technologies have in Nigeria's FinTEch. There are massive benefits from AI driven solutions for financial inclusion, fraud prevention of operational efficiency. Incorporating AI in identity verification processes for onboarding of customers has become more secure, seamless, and efficient especially for the unbanked and underbanked population. There are already systems such as the Bank Verification Number (BVN) and the National Identification Number (NIN) that have demonstrated how digital identity solutions open access to financial services. On the other hand, the study also has its drawbacks because there are data privacy risks, cybersecurity threats and other regulatory challenges that could negatively affect the realization of the full benefits of the use of AI in its financial sector in Nigeria. Like any other AI technologies including the Fraudaeck-AI model, it has proved to have the capacity in improving the authentication and fraud detection but still, have not been able to achieve wide adoption in Nigeria due to the reported gaps in Nigeria's regulatory and governance framework. Thus, there is a need for more empirical studies and real-world case analysis of how financial ecosystem has been impacted using AI enhanced digital identity solutions in Nigeria. In addition, unclear data protection laws and governance AI structures put us at risk of many risks, due to the lack of clear laws from data protection to AI governance structures the consumer data is hardly protected from breaches and unauthorized access. Ultimately, AI has the potential to pave the way for financial security and economic stability in Nigeria, but its success depends on implementation of pro activities policy interventions, development of digital infrastructure and collaboration between stakeholders. To ensure that AI-driven identity solutions are, at once, effective, equitable, and increasingly important to economic growth generally, there will be significant ethical, regulatory, and security challenges to overcome to achieve this.

Recommendation

For Nigeria to fully benefit from the advantages of AI in digital identity verification, while mitigating its risks, it needs to adopt the strategic measures of strengthening regulatory oversight, data security, infrastructure development, building expertise in its workforce, and engaging stakeholders. Specifically, it is necessary to have a robust regulatory framework and tailored to AI applications in financial services. To create ethical AI use, data governance and compliance requirements, the government should develop clear policies. It's also important to strengthen data privacy and cybersecurity regulations that are essential in light of the increasing use of AI powered identity verification, as the latter should not lead to data breaches, unauthorized access, and misuse of customer's sensitive information. The risks will thus have to be mitigated, and these can be mitigated by enforcing stricter security measures like data encryption and AI ethics policies. Like any other tech, investments in digital households are required to make AI adoption and scalability simple. Investments in digital infrastructure are equally important to facilitate AI adoption and scalability.

For seamless integration of AI in financial services, the government and the private sector have to give priority to the expansion of AI supportive technologies like cloud computing, secure databases and high-speed internet. Furthermore, the gap in the AI skill has to be addressed through education and training. Both universities and technology firms should work together with financial institutions to develop a workforce that is knowledgeable enough to use AI driven identity technologies effectively. Therefore, for public trust in AI identity verification systems, awareness campaigns and work together between the regulators, financial institutions, FinTech companies are needed. If Nigeria can facilitate transparency, appropriate ethical AI practices and consumer protection, the country will build functional, secure and inclusive financial ecosystem dependent on the use of AI powered digital identity solutions.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of Interest.

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