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Artificial Intelligence for Financial Inclusion: AI-Powered Mobile Money Services in Sub-Saharan Africa

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ABSTRACT

The rise of artificial intelligence (AI) is reshaping financial services globally, particularly in Sub-Saharan Africa, where financial exclusion remains a major challenge. This review explores how AI-powered mobile money services are driving financial inclusion among unbanked and underbanked populations, with a specific focus on Nigeria and East African countries such as Kenya, Uganda, and Tanzania. Mobile money platforms have revolutionized financial transactions, enabling millions without traditional bank accounts to access basic financial services. By leveraging AI algorithms, these platforms enhance user experiences, predict creditworthiness, detect fraud, and personalize services, thereby fostering trust and inclusivity. The integration of AI in mobile money ecosystems is not only improving service delivery and scalability but also enabling the development of microcredit, insurance, and savings products for low-income users. Despite its promise, AI adoption faces significant challenges, including data privacy concerns, algorithmic bias, infrastructure deficits, and regulatory limitations. This review highlights current advancements, key case studies such as M-Pesa and Paga, and policy recommendations aimed at enhancing AI-driven financial inclusion in Sub-Saharan Africa.

Keywords: Artificial Intelligence, Financial Inclusion, Mobile Money, Nigeria, East Africa.

INTRODUCTION

Financial inclusion, the capacity of individuals and businesses to access affordable, useful, and appropriate financial products and services, such as savings, credit, insurance, and payments, is widely acknowledged as a critical driver of economic development and poverty reduction [1]. In regions where formal banking systems are limited, access to financial services remains one of the most pressing socioeconomic challenges. Nowhere is this more evident than in Sub-Saharan Africa, where over 50% of the adult population remains unbanked. According to the World Bank's 2021 Global Findex Report, millions of people in the region do not have access to a formal bank account due to high transaction costs, geographical isolation, lack of proper identification, poor financial literacy, and underdeveloped banking infrastructure [2]. Over the past two decades, however, the financial services landscape in Sub-Saharan Africa has experienced a paradigm shift with the rise of mobile phone penetration and digital financial technologies [3]. Mobile money services enabling users to store, send, and receive money using mobile devices have become central to efforts aimed at promoting financial inclusion. These innovations have proven especially impactful in East African countries such as Kenya, Uganda, and Tanzania, where platforms like M-Pesa have transformed the way people interact with money. In Nigeria, mobile money adoption has also seen rapid growth, led by fintech companies such as Paga and OPay. These platforms allow users to bypass traditional financial intermediaries, offering convenient and accessible alternatives for the unbanked population. Building on this digital revolution, Artificial Intelligence (AI) has emerged as a transformative force with the potential to further accelerate financial inclusion across the region. AI encompasses a range of technologies, including machine learning, natural language processing, predictive analytics, and data mining, that enable machines to analyze data, make decisions, and automate complex

tasks [4]. When integrated into mobile money platforms, AI enhances the scalability, intelligence, and personalization of financial services. For instance, AI can facilitate alternative credit scoring using non-traditional data (such as mobile phone usage and social media behavior), detect fraudulent transactions in real time, provide personalized financial advice, and automate customer support through chatbots [5]. The convergence of mobile money and AI presents a unique opportunity to address the long-standing challenge of financial exclusion in Sub-Saharan Africa. Unlike conventional banking systems that require extensive physical infrastructure and formal documentation, mobile money platforms offer a low-cost, scalable alternative capable of reaching underserved populations [6]. The application of AI further strengthens these services by making them more responsive, intelligent, and user-centric. In East Africa, AI-powered services such as M-Shwari and Fuliza in Kenya have demonstrated how predictive analytics can be used to extend microloans and overdraft facilities to users with no formal credit history. Similarly, in Nigeria, fintechs like Carbon and FairMoney are deploying AI to assess creditworthiness and deliver instant loans to mobile users. These innovations not only improve financial access but also empower individuals to manage their finances, invest in businesses, and withstand economic shocks. Despite these advancements, several challenges persist. Many AI models depend on large, high-quality datasets that may not always be available in African contexts. Concerns about data privacy, algorithmic bias, and the digital divide also raise ethical and practical questions about the deployment of AI in financial services [7]. Moreover, regulatory frameworks in many African countries are still evolving, creating uncertainties for developers and users alike. While the digital finance revolution has made significant strides in enhancing financial inclusion, a large proportion of Sub-Saharan Africa's population particularly those in remote rural areas and informal economies still lack access to formal financial services. Traditional banking models have proven inadequate in reaching these segments due to high operational costs, stringent documentation requirements, and limited branch networks [8]. Although mobile money services have helped bridge some of these gaps, they often offer only basic transactional services. The problem lies in the fact that most mobile money platforms are not fully optimized for inclusive financial service delivery. They lack intelligent systems capable of understanding user behavior, assessing financial needs, and delivering personalized services. This is where AI can make a significant impact. However, the integration of AI into mobile money ecosystems remains uneven and under-researched, especially in countries like Nigeria and regions within East Africa [9]. There is a critical need to understand how AI can be effectively leveraged to enhance financial inclusion in these contexts. What AI applications are most effective in driving access to credit, savings, insurance, and financial education? How do AI-driven systems impact user trust, accessibility, and financial behavior among unbanked populations? And what policy and regulatory measures are needed to ensure that the deployment of AI in mobile money services is ethical, inclusive, and sustainable? This study aims to explore the pivotal role that Artificial Intelligence (AI) plays in advancing financial inclusion through mobile money services in Sub-Saharan Africa, with particular emphasis on the unbanked populations in Nigeria and East Africa. Financial exclusion remains a critical challenge in these regions, where large segments of the population lack access to formal banking, making mobile money platforms an essential alternative. By investigating how AI technologies are integrated into these platforms, the study seeks to uncover how AI enhances financial access, usage, and service quality for underserved communities. Specifically, it will examine the current AI applications employed in mobile money services, ranging from machine learning algorithms for credit scoring to chatbots for customer engagement and fraud detection systems, thereby providing a comprehensive understanding of AI's practical implementation in these fintech ecosystems. Furthermore, the research will evaluate the tangible impact of AI-driven mobile money solutions on increasing financial inclusion, assessing improvements in accessibility, affordability, and user experience among previously unbanked individuals. Simultaneously, the study recognizes that deploying AI in this context is not without challenges; thus, it will identify technological, regulatory, and ethical barriers that hinder the effective adoption and scaling of AI-enabled financial services. These include issues such as data privacy concerns, lack of digital literacy, infrastructural constraints, and potential biases embedded in AI algorithms. To address these challenges, the study will propose actionable policy and technological recommendations aimed at fostering an enabling environment for responsible AI innovation that prioritizes inclusivity and consumer protection. The significance of this research lies in its potential to inform stakeholders, including policymakers, fintech providers, and development agencies, about designing and implementing AI-powered financial services that are both equitable and impactful. Ultimately, this work contributes to the broader development agenda by highlighting how thoughtfully applied AI in mobile money can empower marginalized populations, improve economic participation, and enhance resilience in Sub-Saharan Africa.

The Landscape of Mobile Money in Sub-Saharan Africa

Sub-Saharan Africa stands at the forefront of the global mobile money revolution, with unprecedented adoption rates that outpace other regions worldwide. Mobile money platforms such as M-Pesa in Kenya, MTN Mobile Money in Uganda, and Paga in Nigeria have fundamentally transformed the financial landscape by providing millions with access to secure, convenient, and affordable financial services. These services have particularly empowered individuals in remote and rural areas, who traditionally lacked access to formal banking institutions, enabling them

to save money, make payments, transfer funds, and even access credit through their mobile phones [10]. This digital financial inclusion has stimulated economic activity by integrating previously unbanked populations into the broader economy. By 2023, the number of active mobile money accounts in Sub-Saharan Africa exceeded 500 million, underscoring the region's remarkable progress. Key factors driving this growth include the widespread penetration of mobile phones, low transaction costs, the simplicity of mobile money interfaces, and the strong trust users place in established mobile network operators who provide these services. Additionally, regulatory frameworks in many countries have evolved to support the expansion of mobile money, fostering innovation and competition. This landscape continues to evolve rapidly, shaping the future of financial services and economic development across the region.

Role of Artificial Intelligence in Mobile Money Services

Artificial Intelligence (AI) is transforming mobile money services by enhancing financial inclusion, security, and customer experience. One significant application is in customer profiling and credit scoring, where AI algorithms analyze alternative data sources such as mobile phone usage patterns, transaction histories, and social media activities to generate credit scores for individuals who lack traditional credit records [11]. This enables platforms like Branch and Tala to assess creditworthiness quickly and issue microloans in real time, thereby helping users build a financial identity and access credit more easily. Furthermore, AI plays a crucial role in fraud detection and risk management by continuously monitoring transaction patterns to identify suspicious or anomalous activities, such as unusual money transfers or identity theft attempts. Machine learning models improve the accuracy and speed of detecting fraud, boosting overall security and user trust. Additionally, AI-powered chatbots leveraging Natural Language Processing (NLP) provide multilingual customer support, financial education, and assistance with transactions, increasing accessibility, especially for users with limited literacy or those in remote areas. Finally, just like in medicine, AI enables the creation of personalized financial products by analyzing individual user behavior to deliver tailored savings prompts, spending alerts, and investment recommendations [12]. These personalized features promote responsible financial habits and increase user engagement, making mobile money services more effective and user-friendly.

Case Studies

Mobile money services across Africa have significantly transformed financial inclusion, leveraging artificial intelligence (AI) to enhance user experience and access to credit. M-Pesa, pioneered by Safaricom in Kenya and East Africa, stands as a landmark success. By analyzing vast user data through AI, Safaricom offers innovative products like Fuliza, an overdraft service, and M-Shwari, which provides microloans and savings options. These have empowered millions, especially those lacking formal financial records, to access credit and manage finances effectively. In Nigeria, Paga employs AI primarily for secure user authentication and fraud prevention, while also developing AI-driven microcredit partnerships. Its agent-based distribution model further enables digital financial services to reach underserved rural areas. Meanwhile, in Uganda and Tanzania, leading mobile money operators Airtel and MTN integrate AI in their Know Your Customer (KYC) processes and customer engagement efforts. Using predictive analytics, they send personalized SMS alerts and nudges, fostering financial literacy and encouraging timely transactions, thus enhancing user retention and trust.

Challenges and Limitations

Challenges and limitations significantly impact the deployment and effectiveness of AI technologies. A major concern is data privacy and security, as the collection and processing of personal information by AI systems often outpace the development of regulatory frameworks, leaving users vulnerable to breaches and misuse [13]. Additionally, algorithmic bias poses a critical challenge; AI models trained on incomplete or skewed datasets can perpetuate existing social inequalities, leading to unfair exclusions or discriminatory outcomes. Infrastructure deficits further limit AI's reach, many rural areas in Africa face unreliable electricity, poor internet connectivity, and low smartphone penetration, all of which constrain access to AI-driven services. Moreover, the lack of comprehensive AI and data governance policies in many African countries creates regulatory and policy gaps, resulting in uncertainty that may stifle innovation and discourage international partnerships. Addressing these challenges requires coordinated efforts in policy development, infrastructure investment, and inclusive data practices to ensure AI benefits all populations fairly and securely.

Opportunities and Future Directions

The future of AI-driven financial services in emerging economies, particularly in sub-Saharan Africa, holds tremendous potential. One critical opportunity lies in the integration of AI platforms with national digital identification systems, including biometric databases [14]. This alignment can greatly enhance Know Your Customer (KYC) processes, reduce identity fraud, and expand access to underserved populations. Moreover, the adoption of open banking principles where data can be securely shared across institutions via standardized APIs can stimulate innovation in services such as credit scoring, micro-lending, and insurance, particularly for those without formal credit histories. Another promising area is the use of AI to promote financial literacy [15]. Conversational AI, chatbots, and gamified applications can deliver engaging, accessible financial education in local languages,

helping users better understand savings, loans, and insurance products. However, to fully harness these innovations, it is essential to establish robust policy and ethical frameworks. These must prioritize inclusivity, transparency, data privacy, and algorithmic accountability to ensure AI does not deepen existing inequalities. Collaborative efforts among governments, financial institutions, tech developers, and civil society will be crucial in shaping a future where AI not only drives financial inclusion but also promotes equitable economic growth across the region [16].

CONCLUSION

Artificial Intelligence is playing a pivotal role in transforming financial inclusion across Sub-Saharan Africa by enhancing the capabilities of mobile money services. From enabling alternative credit scoring and fraud detection to offering personalized financial advice and multilingual customer support, AI has made financial services more accessible, efficient, and user-centered. This transformation is especially critical in regions where traditional banking systems fail to reach marginalized populations. However, realizing the full potential of AI-driven mobile money requires overcoming significant challenges, including infrastructure limitations, data privacy concerns, algorithmic bias, and weak regulatory frameworks. The integration of AI with national digital ID systems, the adoption of open banking principles, and the promotion of financial literacy through localized, AI-powered tools represent vital steps toward inclusive growth. Moving forward, a coordinated, ethical, and inclusive approach grounded in strong policy frameworks and stakeholder collaboration is essential to ensure that AI truly empowers underserved communities and advances equitable financial development across the continent.

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