

Journal of Business and Economic Options



Examining the Relationship of Information and Communication Technology and Financial Access in Africa

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Abstract

This study also explores the potential prospects and opportunities for leveraging mobile technology to enhance financial inclusion and improve the quality of life on the continent. One key aspect of the study is to analyze the growth and adoption of mobile phone technology across Africa over the past decade. By assessing the penetration rates of mobile phones and the availability of mobile network coverage, the study aims to provide insights into the extent to which mobile banking can reach underserved populations in remote and rural areas. Furthermore, the study delves into the various models and technologies used in mobile banking, including SMS-based transactions, mobile internet banking, and mobile applications. By comparing the effectiveness and accessibility of different mobile banking platforms, the study seeks to identify the most promising approaches for expanding financial services to unbanked and underbanked populations. Moreover, the study examines the regulatory and policy environment surrounding mobile banking in Africa. By analyzing the regulatory frameworks and government policies governing mobile banking operations, the study aims to assess the impact of regulatory barriers on the growth and development of mobile banking services. Additionally, the study investigates the role of financial institutions, mobile network operators, and technology providers in driving the adoption and expansion of mobile banking in Africa. By examining the partnerships and collaborations between different stakeholders, the study seeks to identify strategies for overcoming barriers and promoting innovation in the mobile banking ecosystem. Furthermore, the study explores the potential socio-economic impacts of mobile banking on African communities, including improved access to financial services, increased savings and investment, and enhanced economic empowerment. By analyzing the broader implications of mobile banking for poverty reduction and sustainable development, the study aims to highlight the transformative potential of mobile technology in Africa. This study represents a comprehensive analysis of the challenges and prospects of mobile banking in Africa, drawing on empirical data and theoretical insights from the fields of economics, technology, and development studies. Through its multidisciplinary approach, the study aims to inform policymakers, practitioners, and stakeholders about the opportunities and constraints facing mobile banking in Africa and to contribute to the ongoing efforts to promote financial inclusion and economic development on the continent.

Keywords: Mobile Banking, Financial Inclusion, Africa, Mobile Technology, Regulatory Environment

JEL Codes: G21, O16, O33

1. INTRODUCTION

Access to financial services has the potential to significantly improve the lives of people in developing countries by providing them with essential tools for financial stability, empowerment, and economic growth (Salignac, et al., 2022; Ali, 2022). Despite this potential, a significant portion of the population in these regions still faces limited access to financial services. It is notable that over a billion people in Africa, Latin America, and Asia lack access to traditional banking services, such as bank accounts. However, many of these individuals do have access to mobile phones, highlighting the widespread penetration of mobile technology in these regions. The rise of mobile technology has opened up new opportunities for expanding financial inclusion, as mobile phones can serve as a gateway to a wide range of financial services, including mobile banking, digital payments, and microfinance. Mobile money platforms, for example, allow users to send and receive money, pay bills, and access other financial services directly from their mobile phones, without the need for a traditional bank account (Kitimbo, 2021; Khan, 2022; Kallianiotis, 2022). By leveraging mobile technology and innovative fintech solutions, governments, financial institutions, and development organizations can work together to extend financial services to underserved populations, empowering individuals to manage their finances, build savings, access credit, and invest in their futures. Efforts to promote financial inclusion must address not only access to financial services but also issues of affordability, usability, and trust. Additionally, initiatives should focus on promoting financial literacy and education to ensure that individuals can make informed decisions about their finances and fully benefit from the

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opportunities provided by expanded access to financial services (Ahmad and Rehman, 2017; Bhattacharyya and Palit, 2021; Ahmad, 2022).

The rapid growth of mobile phone penetration in the developing world has been nothing short of remarkable, with annual growth rates consistently ranging between 30% and 50% or even higher. This surge in mobile phone adoption has led to a significant increase in penetration rates, particularly in regions such as Africa (Ochoa, et al., 2022). Over the last decade, from 1998 to 2009, Africa experienced an explosion in mobile phone penetration. During this period, the number of mobile phone subscriptions per 100 people skyrocketed from a mere 0.53 to an impressive 42.82. This exponential growth has transformed the telecommunications landscape across the continent, facilitating greater connectivity, communication, and access to information for millions of people. The widespread availability and affordability of mobile phones, coupled with innovative mobile technologies and services, have played a pivotal role in driving this rapid expansion (Omri, 2022; Baumüller, 2022). Mobile phones have become essential tools for communication, commerce, and financial inclusion, bridging gaps in access to information and services in remote and underserved areas. As mobile phone penetration continues to increase, particularly in developing regions, it presents unprecedented opportunities for promoting economic development, empowering individuals, and advancing social progress. By harnessing the potential of mobile technology and leveraging innovative solutions, stakeholders can work towards realizing the transformative impact of mobile connectivity on people's lives and livelihoods across the globe (Zubair and Hayat, 2020; Ali and Sajid, 2020; Kurniawan, et al., 2022). The declining cost of mobile handsets, particularly 2G devices, has played a significant role in driving the rapid expansion of mobile phone penetration in Africa and other developing regions. Between 2003 and 2008, the average price of a 2G handset dropped from \$150 to \$75, making mobile phones more accessible to a broader segment of the population.

The fastest-growing continent in terms of ICT sector growth (Audi et al., 2021; Audi et al., 2022), with mobile phone penetration experiencing explosive growth since the early 2000s. By 2012, it was projected that most villages in Africa would have mobile coverage, with only a few countries such as Guinea Bissau, Ethiopia, Mali, and Somalia remaining relatively unconnected. The widespread availability of mobile telephony has unlocked new possibilities for the continent, bridging urban-rural and rich-poor divides by connecting individuals to individuals, information, markets, and services (Courrier and Oliveira, 2021). Mobile phones have become indispensable tools for communication, commerce, and accessing essential services such as healthcare, education, and banking. This connectivity revolution has empowered individuals and communities across Africa, enabling them to participate more fully in the digital economy and improving their quality of life (Roy and Madheswaran, 2018; Abdulai, 2022). As mobile technology continues to evolve and expand, it holds the potential to drive further innovation, economic growth, and social development across the continent. The rapid growth of mobile telephony in sub-Saharan Africa has created a unique opportunity for mobile phone banking to thrive on the continent. However, despite the widespread adoption of mobile phones, financial services penetration remains low, presenting significant challenges and opportunities for expanding access to banking services. Indeed, a large proportion of the population in sub-Saharan Africa lacks access to traditional banking services, with only approximately 20% of African families having bank accounts (Pushkareva, 2021). This limited access to banking services underscores the need for innovative solutions to bridge the gap between financial exclusion and the growing ubiquity of mobile technology. For example, in Kenya, despite the proliferation of mobile phones, only around 30% of households had bank accounts in 2007. Similarly, in Benin, a country with a population of 7 million, there were only 35 bank branches in 2006, highlighting the scarcity of traditional banking infrastructure in many parts of the region.

In response to these challenges, mobile phone banking has emerged as a promising solution to expand financial inclusion and empower underserved populations (Parvin and Panakaje, 2022). Mobile money platforms, such as M-Pesa in Kenya, have revolutionized the way people access financial services by allowing them to conduct a wide range of transactions directly from their mobile phones, including sending and receiving money, paying bills, and accessing savings and credit services. By leveraging the widespread availability and affordability of mobile phones, mobile phone banking has the potential to reach millions of people who have limited or no access to traditional banking services, thereby promoting financial inclusion, fostering economic empowerment, and driving sustainable development in sub-Saharan Africa (Inoussa, 2021). However, efforts are needed to address regulatory and infrastructure challenges, promote financial literacy, and build trust and confidence in mobile banking services to unlock the full potential of this transformative technology. The limited access to financial services in Africa is attributable to various factors, including deficient infrastructure, physical-geographical isolation, inaccessibility, and financial illiteracy. These challenges collectively contribute to the high cost of providing banking services, exacerbating financial exclusion across the continent. In many parts of Africa, deficient infrastructure and physical-geographical isolation pose significant barriers to accessing banking services (Ogbole and Ogochukwu, 2022). Remote and rural areas often lack adequate banking infrastructure, such as bank branches and ATMs, making it difficult for individuals living in these areas to access basic financial services. Moreover, financial illiteracy among populations in Africa further compounds the issue of limited access to banking services. Many people lack the necessary knowledge and understanding of financial products and services, hindering their ability to engage with formal banking institutions (de la Cuesta-González, et al 2021).

As a result of these challenges, the ratio of bank branches per 100,000 people varies significantly across African countries. For example, Ethiopia, Uganda, and Tanzania each have less than one bank branch per 100,000 people, highlighting the scarcity of banking infrastructure in these countries. In contrast, countries like Namibia, Zimbabwe, and Botswana have

higher ratios, with more than three to four bank branches per 100,000 people. This disparity underscores the uneven distribution of banking services across the continent and the urgent need for targeted interventions to address the root causes of financial exclusion. Efforts to improve infrastructure, promote financial literacy, and expand access to banking services in underserved areas are essential for fostering greater financial inclusion and economic empowerment across Africa (Sarpong and Nketiah, 2022). By addressing these systemic challenges, policymakers and stakeholders can work towards building a more inclusive and resilient financial ecosystem that benefits all segments of society. The high transaction costs associated with traditional banking services in Africa often pose challenges for individuals, even those with bank accounts, to access and manage their finances effectively. This gap in the financial services market has created a unique opportunity for mobile phone banking to flourish on the continent, offering a convenient and accessible alternative for millions of people (Mogaji, et al., 2021). Mobile phone banking has emerged as a game-changer in Africa, leveraging the widespread adoption of mobile technology to provide a range of financial services to underserved populations. With the ability to open accounts, check balances, pay bills, transfer money, and cater to daily needs, mobile phone banking is revolutionizing access to finance, particularly in remote areas where traditional banks are physically absent. Countries like South Africa, the Democratic Republic of Congo (DRC), Zambia, and Kenya are at the forefront of mobile phone banking adoption, extending financial services to previously underserved communities. By harnessing the power of mobile phones, subscribers can now access a wide range of banking services from the convenience of their handheld devices, without the need to visit a physical bank branch (Kumar, 2022). Moreover, mobile phones are not only transforming financial services but also expanding access to other essential public services. From monitoring elections to delivering public health messages, mobile technology is increasingly being utilized to address societal challenges and improve the lives of people across Africa. As mobile phone banking continues to evolve and expand, it has the potential to substantially increase financial inclusion and empower individuals and communities to manage their finances more effectively. By leveraging innovative technology solutions, Africa can unlock new opportunities for economic development, social progress, and inclusive growth, ultimately transforming the continent's financial landscape for the better.

2. MOBILE BANKING CONCEPT AND E-PAYMENTS EMERGENCE

Mobile banking, also referred to as M-banking or SMS banking, allows users to conduct various financial activities via mobile devices such as mobile phones. This includes tasks like balance checks, account transactions, and payments, typically facilitated through SMS or the Mobile Internet, and sometimes through specialized programs called clients downloaded to the mobile device. The comprehensive range of activities covered by mobile banking includes mini-statements, account history checks, alerts on account activity or thresholds, monitoring of term deposits, access to loan and card statements, management of mutual funds, equities, insurance policies, and pension plans. Users can also manage cheques, including status checks, stop payments, and ordering cheque books, as well as perform tasks like balance inquiries, recent transaction reviews, and managing payment due dates with functionalities for stop, change, and deletion. PIN management functionalities, blocking of lost or stolen cards, domestic and international fund transfers, micro-payment handling, mobile recharging, commercial and bill payment processing, peer-to-peer payments, withdrawal, and deposit at banking agents are also integral to mobile banking. These functionalities offer users convenience, flexibility, and enhanced control over their finances (Rahman, 2012).

In recent years, there has been a proliferation of initiatives aimed at enabling e-payments through mobile phones, reflecting the increasing reliance on mobile technology for financial transactions. These initiatives, commonly referred to as m-payments, have garnered significant attention from both consumers and businesses due to their convenience and accessibility. As highlighted by Vassiliou (2004), the typical model followed by most m-payment initiatives involves a straightforward process. Initially, the customer, or payer, establishes their identity with the merchant by providing their phone number or initiating a call. This interaction serves as the initial step in initiating the payment transaction. Subsequently, the merchant transmits the payment details along with the customer's information to the payment service provider, typically leveraging the existing mobile network infrastructure. This intermediary role of the payment service provider is crucial in facilitating the seamless transfer of funds between the payer and the merchant. Once the payment information reaches the payment service provider, they present it to the payer for confirmation. This confirmation step is essential for ensuring the security and accuracy of the transaction. Payers may be required to authenticate the transaction by entering a PIN number or utilizing another form of verification mechanism. Upon receiving confirmation from the payer, the payment service provider records the transaction, thereby completing the payment process. This record-keeping function is vital for both the payer and the merchant, as it provides a transparent and auditable trail of the transaction for future reference. In the context of m-payment initiatives, communication between the customer and the payment provider and/or merchant can occur through various channels, including phone calls and short messages. These channels serve as the primary means of initiating and confirming payment transactions, providing users with flexibility and convenience in conducting financial activities through their mobile devices. In this model, the paid amount is typically collected from the payer's account through direct debit and credited to the beneficiary's account. This seamless transfer of funds between accounts facilitates efficient and secure transactions, eliminating the need for cash or physical payment instruments. Operational examples of this m-payment model can be found across the European Union, where various platforms have been developed to cater to the evolving needs of consumers and businesses. For instance, Paybox operates in Austria,

Germany, Spain, Sweden, and the United Kingdom, offering users a convenient and reliable solution for mobile payments. Similarly, Mint in Sweden and e-pay in Finland are other examples of platforms that have gained traction in their respective markets, providing users with access to a wide range of payment services through their mobile phones. These operational examples underscore the growing popularity and acceptance of m-payment solutions in Europe, as consumers increasingly embrace mobile technology for managing their financial transactions. By leveraging innovative technologies and payment methods, these platforms contribute to the ongoing digital transformation of the financial industry, making payments more accessible, efficient, and secure for users across the EU.

Vassiliou (2004) emphasizes the advantageous position of mobile devices for facilitating payments, highlighting their widespread adoption compared to personal computers. With higher penetration levels of digital mobile phones, these devices offer unparalleled convenience and accessibility for conducting various types of payments. Furthermore, mobile phones can be utilized for transactions at both manned and unmanned payment terminals, enabling seamless payment experiences in diverse settings, including online transactions and peer-to-peer payments between consumers. The recent introduction of m-payments by MTN in Ghana further underscores the growing significance of mobile technology in the payment ecosystem. By leveraging mobile phones as payment tools, MTN aims to meet the evolving needs of consumers and businesses in Ghana, providing them with convenient and secure payment solutions tailored to the mobile-first environment. This initiative reflects the broader trend of mobile-driven innovation in the financial sector, where mobile devices are increasingly becoming integral to everyday payment transactions. As m-payment solutions continue to evolve and expand, they have the potential to revolutionize the way people manage their finances, driving financial inclusion and empowering individuals to participate more actively in the digital economy.

3. ACCESS TO FINANCE AND MOBILE BANKING- TAKING BANK TO CUSTOMERS

The emergence of electronic payment systems has brought about a significant shift in the banking landscape, with banks increasingly recognizing the vast potential of reaching millions of prospective customers, particularly in rural areas. In Africa, where more than 60% of the total population resides in rural regions and lacks access to traditional banking services, electronic payment systems offer a promising solution to bridge this gap. One of the key challenges in rural areas has been the underdevelopment of the commercial bank branch network, limiting access to financial services for rural populations. However, with mobile phone penetration surpassing 50% of the adult population in Africa, mobile banking has emerged as a viable alternative to traditional banking services. The cases of Kenya and South Africa serve as compelling examples of how mobile banking can effectively extend financial services to rural populations. In Kenya, the mobile money service M-Pesa has revolutionized the financial landscape, allowing users to conduct a wide range of financial transactions directly from their mobile phones (Kusimba, 2021). Similarly, in South Africa, mobile banking initiatives have enabled rural communities to access banking services conveniently and securely, empowering them to participate more actively in the formal financial sector. By leveraging mobile technology, banks can overcome the barriers posed by physical distance and infrastructure limitations in rural areas, enabling them to reach underserved populations with tailored financial solutions. Mobile banking not only enhances financial inclusion but also fosters economic empowerment and resilience within rural communities, driving sustainable development and growth across the continent.

The cost of formal banking services in Africa remains prohibitively high, with minimum deposit requirements sometimes reaching as much as 50% of the per capita GDP in certain countries. Furthermore, limited internet access and low broadband subscription rates render internet banking inaccessible to the majority of the population. In light of these challenges, mobile banking emerges as a promising solution for providing financial services to the unbanked. Recognizing the potential of mobile technology to address financial inclusion barriers, financial institutions and mobile phone service providers are collaborating to develop innovative methods of integrating underserved populations into the formal economy using mobile phones. By leveraging the widespread adoption of mobile phones across Africa, these stakeholders are pioneering resourceful approaches to extend financial services to previously excluded segments of society (Mogaji, et al., 2021). Mobile banking offers a convenient and accessible means for individuals to manage their finances, conduct transactions, and access a range of banking services directly from their mobile devices. Whether through mobile money platforms, SMS-based banking, or mobile banking applications, these initiatives empower individuals to participate in the formal financial system without the need for traditional bank branches or internet connectivity. By harnessing the ubiquity of mobile phones, financial institutions and mobile service providers are driving financial inclusion efforts across Africa, enabling millions of unbanked individuals to access essential financial services, build savings, and engage in economic activities. Through collaborative efforts and innovative solutions, mobile banking is playing a transformative role in expanding access to financial services and fostering inclusive growth and development across the continent. Mobile phones offer banks a transformative tool for reaching customers regardless of their location. The inherent capabilities of mobile phones enable banks to extend their services to even the most remote areas, overcoming geographical constraints and expanding their customer base. One of the primary advantages of mobile banking lies in its ability to significantly reduce the costs associated with financial transactions, making banking services more accessible and affordable for individuals across all socioeconomic segments. Mobile banking serves as a powerful means of delivering savings services to the billions of people worldwide who possess a cell phone but lack access to traditional banking services. By leveraging mobile

technology, banks can offer a wide range of financial services directly to customers' mobile devices, eliminating the need for physical bank branches and cumbersome paperwork.

Compared to traditional banking methods, mobile banking offers several distinct advantages. Firstly, it breaks down geographical barriers, allowing individuals in remote areas to access banking services conveniently from their mobile phones. Additionally, mobile banking offers immediacy, enabling customers to conduct transactions and access account information in real-time, anytime, and anywhere. Moreover, mobile banking enhances security by implementing robust authentication mechanisms and encryption protocols to protect customers' sensitive financial information (Ali, et al., 2021). The efficiency of mobile banking streamlines the banking process, reducing wait times and administrative overhead associated with traditional banking methods. These advantages of mobile banking, particularly its practicality in remote field conditions, make it a compelling solution for expanding financial inclusion and empowering individuals to participate more actively in the formal financial system. By leveraging the power of mobile technology, banks can drive greater financial access, inclusion, and empowerment, ultimately contributing to broader socioeconomic development and prosperity. The versatility of mobile phones extends to their potential applications in banking and financial transactions. Firstly, mobile phones can function as virtual bank cards, storing securely both customer and institution information. This capability eliminates the need for physical distribution of cards to customers, reducing associated costs. Notably, the subscriber identity module (SIM) card found in most GSM phones acts as a smartcard, akin to a virtual bank card. Information such as the bank customer's PIN and account number can be securely stored on the SIM card, enabling it to perform the same functions as a traditional bank card. Secondly, mobile phones can serve as point-of-sale (POS) terminals, allowing users to transact and communicate with financial institutions for transaction authorization. This functionality mirrors that of POS terminals commonly found in malls, retail outlets, and other stores. By leveraging mobile phones as POS terminals, businesses and individuals can facilitate secure and convenient transactions, enhancing the overall efficiency of payment processes. Thirdly, mobile phones have the potential to function as ATMs, providing users with access to banking services and cash withdrawals remotely. Similar to POS terminals, mobile phones can replicate the functionality of traditional ATMs, enabling users to perform various banking transactions, such as balance inquiries, fund transfers, and cash withdrawals, directly from their mobile devices (Aker and Mbiti, 2010). The multifunctionality of mobile phones in banking and financial transactions underscores their transformative potential in reshaping the way individuals and businesses interact with financial services. By leveraging mobile technology, banks and financial institutions can enhance accessibility, convenience, and security, ultimately driving greater financial inclusion and empowerment for individuals across diverse socioeconomic backgrounds.

Indeed, when we view cash and access to savings as goods and services that customers acquire at the store, the point-of-sale (POS) terminal effectively functions as a cash collection and distribution point, akin to an automatic teller machine (ATM). This expanded functionality highlights the versatility of mobile phones in facilitating a wide range of financial transactions, from purchases to cash withdrawals and deposits.

Additionally, mobile phones can serve as Internet banking terminals, offering customers instant access to their accounts and enabling remote payments and transfers. By providing these fundamental banking services through mobile devices, banks can extend their reach to previously unbanked individuals, empowering them with convenient and secure access to financial services. The integration of mobile phones with wireless connectivity further enhances the accessibility of Internet banking, bringing the capabilities of traditional Internet terminals into the hands of individuals who may not have access to traditional banking infrastructure. This democratization of access to banking services has the potential to significantly expand financial inclusion and empower individuals to manage their finances more effectively, regardless of their geographic location or socioeconomic status. The convergence of mobile technology and banking services opens up new possibilities for reaching underserved populations and driving greater financial inclusion. By leveraging the inherent capabilities of mobile phones, financial institutions can create innovative solutions that address the diverse needs of customers and contribute to the advancement of financial inclusion and economic development.

4. MOBILE BANKING INITIATIVES IN AFRICA

Despite the overall limited development of e-payment systems in Africa, certain countries on the continent have made significant strides in the realm of e-payments and e-commerce. One notable trend is the increasing adoption of mobile banking across various African nations, with South Africa emerging as a frontrunner in this regard. South Africa stands out as the country with the highest prevalence of mobile banking usage on the continent. By the end of March 2009, South Africa's total mobile customer base had expanded by 3.8% compared to the previous year, surpassing 51.9 million individuals. This growth propelled the mobile penetration rate to an impressive 107%. However, despite this widespread mobile connectivity, a significant portion of South Africa's population remains unbanked. Approximately half of South Africa's citizens do not have formal bank accounts, presenting a substantial barrier to financial inclusion. Moreover, nearly 40% of the population is either unemployed or engaged in informal employment, often receiving payment in cash. The high cost of bank charges and stringent banking regulations, such as requirements for proof of regular income, further hinder access to formal banking services for many individuals, particularly those from disadvantaged socio-economic backgrounds. In light of these challenges, mobile banking has emerged as a vital alternative for individuals seeking to access financial services in South Africa. The convenience and accessibility offered by mobile banking platforms have enabled millions of

unbanked individuals to engage in banking activities, such as money transfers, bill payments, and account management, directly from their mobile devices. By leveraging mobile technology, South Africa's financial sector has made significant strides in bridging the gap between the banked and unbanked populations, paving the way for greater financial inclusion and empowerment across the country. South Africa has seen the proliferation of various mobile banking initiatives, with one of the most prominent being the MTN Banking Mobile Money Account. This account offers clients comprehensive banking flexibility, granting them access to their accounts from anywhere in the world and at any time through a secure connection using an MTN cellphone. By empowering customers to manage their finances remotely, Mobile Money puts control firmly in the hands of users, facilitating seamless banking transactions on the go.

In a significant move towards expanding financial inclusion, South Africa's MTN announced plans in 2010 to introduce a fully-fledged bank account accessible via mobile phones, complete with an optional credit card feature. This groundbreaking service was slated to be extended to the 20 countries where MTN operates, including Uganda, Nigeria, Cameroon, and Ivory Coast, collectively boasting over 90 million mobile phone users. By leveraging the extensive reach of its mobile network, MTN aimed to democratize access to banking services and empower millions of individuals across Africa to participate more actively in the formal financial system (Ondiege, 2010). In addition to MTN's initiatives, other notable mobile banking transfer services have been launched in South Africa. The WIZZIT Scheme, established in 2004, has played a pivotal role in promoting financial inclusion by providing banking services to underserved communities. Similarly, Flash Mobile Cash by Eezi, also known as Flash Mobile Cash, enables home shop owners to serve as informal banking agents, bridging the gap in areas lacking formal banking infrastructure. Additionally, the Vodacom-Nedbank M-PESA partnership has introduced mobile money transfer services to further enhance financial accessibility and convenience for customers.

These mobile banking initiatives underscore South Africa's commitment to leveraging mobile technology to drive financial inclusion and empower individuals with access to essential banking services. By embracing innovative solutions and partnerships, South Africa's financial sector is spearheading efforts to bridge the gap between the banked and unbanked populations, ultimately fostering greater economic inclusion and prosperity across the country and beyond (Mavhuru, 2022). In Kenya, access to formal banking services remains limited, with only 19% of the adult population having access to a traditional bank account. Banking services are predominantly concentrated in urban areas, leaving many rural and underserved populations without adequate access to financial services. However, the landscape is evolving rapidly, driven by innovative mobile banking solutions provided by cellular operators. Notably, Safaricom's M-PESA and MKESHO, along with Zain's ZAP, have emerged as key players in expanding financial inclusion across Kenya. These mobile banking platforms have revolutionized the way individuals manage their finances, offering convenient, accessible, and secure banking services directly from their mobile devices. The rapid growth of mobile telephony in Kenya has further fueled the adoption of mobile banking solutions. Between 2005 and 2009, the number of mobile telephony subscribers surged from 4.5 million to 17.4 million, representing a remarkable growth rate of 34.2% annually. This widespread penetration of mobile phones has provided the foundation for the proliferation of mobile banking services, enabling millions of Kenyans to access banking services conveniently, even in remote areas where traditional banking infrastructure is lacking. Through initiatives like M-PESA, MKESHO, and ZAP, cellular operators have played a pivotal role in democratizing access to financial services and bridging the gap between the banked and unbanked populations in Kenya (Ondiege, 2013). By leveraging mobile technology, these platforms have empowered individuals with the ability to conduct transactions, transfer money, pay bills, and access savings and credit services seamlessly, transforming the financial landscape of the country and driving greater economic inclusion and prosperity for all.

The expansion of mobile telephony and mobile banking services in Kenya has been nothing short of remarkable, with significant growth observed in both subscriber numbers and service capabilities. As of 2010, the number of mobile telephony subscribers is estimated to exceed 20 million, reflecting a substantial increase from previous years. Moreover, the mobile telephony capacity has surged from 6.8 million in 2005 to 29.0 million in 2009, underscoring the rapid expansion of mobile infrastructure across the country. Since its launch in 2007, M-PESA mobile transfer services have continued to evolve, offering a wide range of functionalities to users (Regragui, 2022). Organizations can now conveniently pay employee salaries using the Bulk Payment function, while individuals can transfer money and settle utility bills directly from their mobile phones. This convenience has revolutionized financial transactions, making banking services more accessible and efficient for Kenyan citizens. A recent milestone in Kenya's mobile banking landscape is the partnership between Equity Bank and Safaricom to introduce the M-KESHO account. This collaboration represents a convergence of mobile technology and banking services, aiming to extend formal banking services to over 18 million Kenyans. Similar to M-PESA, M-KESHO accounts boast no account opening fees, minimum balances, or monthly charges. Moreover, these accounts earn interest and offer features such as microcredit facilities, microinsurance, and personal accident cover, providing comprehensive financial solutions to users. M-KESHO clients have the flexibility to open accounts at Equity Bank branches or through a network of 5,000 M-PESA agents, where Equity Bank representatives are stationed. Additionally, users can conduct transactions at any of the 17,000 M-PESA retail outlets, further enhancing accessibility and convenience. This innovative partnership exemplifies the transformative power of mobile banking in Kenya, empowering millions of individuals with access to formal banking services and fostering financial inclusion and prosperity across the country.

5. CHALLENGES OF MOBILE BANKING IN AFRICA

Infrastructure plays a crucial role in the effective implementation of mobile payments, presenting both opportunities and challenges for financial inclusion. Tadesse and Kidan (2005) highlight the significance of reliable and cost-effective infrastructure to support electronic payments, which are essential for facilitating transactions across a wide spectrum of users. For electronic payments to thrive, a robust communication infrastructure is imperative. This includes computer networks such as the internet and mobile networks utilized for mobile phone transactions. These networks serve as the backbone for conducting electronic transactions securely and efficiently, enabling individuals to access financial services remotely and conveniently. Furthermore, the automation of banking activities and operations is essential for the seamless functioning of electronic payment systems. This automation streamlines processes such as account management, transaction processing, and fund transfers, enhancing the overall efficiency and effectiveness of financial services. Additionally, the establishment of a network that links banks and other financial institutions for clearing and payment confirmation is a fundamental requirement for electronic payment systems. This network facilitates the swift and accurate settlement of transactions, ensuring that payments are processed in a timely manner and with minimal errors.

The accessibility and reliability of communication infrastructure pose significant challenges to the widespread adoption of electronic payment systems in Africa. Unlike in developed countries where mobile networks and internet services are readily available and reliable, Africa faces obstacles related to poor communication infrastructure, hindering the advancement of e-payment systems. As noted by Tadesse and Kidan (2005), inadequate communication infrastructure is a key barrier to the successful implementation of electronic payment systems in Africa. In many parts of Africa, mobile networks and internet connectivity are not easily accessible or reliable. This lack of access limits individuals' ability to engage in electronic transactions, including mobile banking and online payments. Furthermore, intermittent network coverage and slow internet speeds further exacerbate the challenges faced by users, making it difficult to conduct financial transactions efficiently and securely. The disparity in communication infrastructure between developed and developing regions underscores the need for targeted efforts to address infrastructure gaps in Africa. Investments in expanding and improving mobile networks, internet connectivity, and digital infrastructure are essential for enhancing the accessibility and reliability of communication services across the continent. Additionally, initiatives aimed at promoting digital literacy and skills development can empower users to leverage electronic payment systems effectively, bridging the gap between technology adoption and financial inclusion. By addressing the underlying challenges associated with communication infrastructure, African countries can unlock the potential of electronic payment systems to drive financial inclusion, economic growth, and social development. Collaboration between governments, private sector stakeholders, and international organizations is crucial for building resilient and inclusive communication infrastructure that meets the evolving needs of African populations and supports the transition towards a digital economy.

Worku (2010) highlights the significant challenges posed by low levels of internet penetration and poorly developed telecommunication infrastructure on the advancement of e-commerce and mobile banking in Africa. These constraints hinder the smooth development and improvement of digital financial services across the continent, limiting the potential for widespread adoption and utilization by the population. Low levels of internet penetration present a major barrier to the growth of e-commerce and mobile banking in Africa. Limited access to the internet restricts individuals' ability to engage in online transactions, hindering the expansion of digital markets and commerce platforms. Without widespread internet connectivity, businesses face challenges in reaching customers, conducting transactions, and providing online services, thereby impeding the development of e-commerce ecosystems. Furthermore, poorly developed telecommunication infrastructure exacerbates the challenges faced by users and businesses in accessing digital financial services Bayar, et al (2021). Inadequate network coverage, unreliable connectivity, and slow internet speeds hinder the functionality and effectiveness of mobile banking and other electronic payment systems. Without robust telecommunication infrastructure, the seamless and secure transfer of funds, access to banking services, and utilization of mobile payment platforms are compromised, limiting financial inclusion and economic development. Addressing the barriers posed by low internet penetration and inadequate telecommunication infrastructure requires concerted efforts from governments, private sector stakeholders, and international partners. Investments in expanding broadband connectivity, upgrading telecommunications networks, and deploying innovative technologies are essential for improving access to digital financial services across Africa. Additionally, initiatives to promote digital literacy, foster innovation, and enhance regulatory frameworks can facilitate the growth of e-commerce and mobile banking, unlocking new opportunities for economic empowerment and inclusion in the digital age. Mishra (2008) explores the challenges faced in Nepal regarding the development of e-payments, highlighting the significant impact of limited access to telecommunication and electricity infrastructure on the advancement of digital financial services. In Nepal, the lack of widespread availability of telecommunication networks and reliable electricity supply presents major obstacles to the adoption and expansion of e-payment systems across the country.

The absence of comprehensive telecommunication infrastructure in Nepal restricts the accessibility of digital financial services to a significant portion of the population. Many rural and remote areas lack access to mobile networks and internet connectivity, limiting individuals' ability to engage in electronic transactions and utilize mobile banking services. Without reliable communication networks, the delivery of e-payment solutions becomes challenging, hindering financial inclusion and limiting the reach of digital banking services to underserved communities. Furthermore, the intermittent availability of electricity further compounds the challenges faced in implementing e-payment systems in Nepal. In areas where access to

electricity is unreliable or non-existent, the operation of electronic payment terminals, mobile banking applications, and digital transaction platforms may be severely impacted. Dependence on electricity for powering devices and infrastructure necessary for e-payments poses logistical challenges and increases the vulnerability of digital financial services to disruptions. Addressing the infrastructure gaps related to telecommunication and electricity supply is essential for overcoming the barriers to e-payment development in Nepal. Investments in expanding telecommunications networks, improving internet connectivity, and extending electricity infrastructure to rural and remote areas are critical for enhancing the accessibility and reliability of digital financial services. Additionally, the deployment of alternative energy solutions and innovative technologies can help mitigate the challenges posed by electricity shortages, ensuring the seamless operation of e-payment systems and promoting financial inclusion and economic development across Nepal. Mishra (2008) underscores the pivotal role of information and communication technology (ICT) in the development of e-payments in Nepal while highlighting the significant challenges posed by the nascent state of ICT infrastructure in the country. Nepal's limited progress in ICT adoption and development presents a formidable obstacle to the promotion and advancement of e-payment solutions, hindering the country's efforts to embrace digital financial services.

As Mishra (2008) elucidates, the infancy of ICT in Nepal manifests in various forms, including inadequate telecommunications infrastructure, limited internet connectivity, and a lack of digital literacy among the population. These deficiencies constrain the adoption and utilization of e-payment systems, as individuals and businesses face barriers in accessing digital financial services and engaging in electronic transactions. Furthermore, the underdeveloped state of ICT in Nepal inhibits the deployment of sophisticated e-payment technologies and platforms, limiting the range of available solutions and constraining innovation in the financial sector. Without robust ICT infrastructure, the implementation of secure and reliable e-payment systems becomes challenging, impeding efforts to modernize the country's financial ecosystem and promote financial inclusion. Addressing the challenges associated with ICT development is paramount for fostering the growth of e-payments in Nepal. Mishra's (2008) analysis underscores the importance of strategic investments in expanding telecommunications networks, enhancing internet connectivity, and promoting digital literacy initiatives to build the foundation for a thriving digital economy. By prioritizing ICT infrastructure development and embracing technological innovation, Nepal can overcome barriers to e-payment adoption and unlock new opportunities for economic growth and financial inclusion.

6. PROSPECTS OF MOBILE BANKING IN AFRICA

The rapid growth and widespread adoption of mobile telephony in Africa are revolutionizing access to financial services, offering a transformative opportunity to address longstanding challenges of financial exclusion across the continent. As mobile phones increasingly function as "banks in pockets," they provide a gateway for reaching underserved populations and expanding access to affordable and efficient financial services to millions of individuals who have been marginalized from formal banking systems for generations. This transformative shift is not only significant for traditional banks and mobile financial institutions (MFIs) but also holds profound implications for governments, financial regulators, and development partners invested in enhancing the well-being of African communities through poverty alleviation and sustainable economic development. By leveraging the ubiquity of mobile phones and the growing ecosystem of mobile financial services, stakeholders across the spectrum recognize the potential to foster financial inclusion, empower individuals and businesses, and drive broader socioeconomic progress across the continent. For banks and MFIs, the proliferation of mobile banking presents an opportunity to extend their reach beyond traditional brick-and-mortar branches, tapping into new markets and customer segments previously underserved or overlooked. By offering a suite of mobile-based financial products and services, these institutions can cater to the diverse needs of consumers, including savings, payments, remittances, and credit, in a convenient and accessible manner Musa, (2022). Governments and financial regulators play a critical role in fostering an enabling regulatory environment that supports the growth of mobile financial services while safeguarding consumer protection and financial stability. Through policies and regulations that promote innovation, competition, and interoperability within the mobile money ecosystem, regulators can encourage the expansion of inclusive financial systems that benefit all segments of society. Development partners, including international organizations, donor agencies, and non-governmental organizations, contribute expertise, resources, and technical assistance to support initiatives aimed at enhancing financial inclusion and fostering sustainable economic growth in Africa. By collaborating with governments, financial institutions, and technology providers, development partners can help catalyze the adoption of mobile financial services, strengthen digital infrastructure, and build capacity to ensure the effective delivery of inclusive financial solutions to underserved communities.

7. CONCLUSIONS

The remarkable growth of mobile phone usage in sub-Saharan Africa over the past decade, now reaching 60 percent of the population, underscores the transformative impact of telecommunications on the region's socioeconomic landscape. At the consumer level, widespread access to mobile phones empowers individuals with newfound connectivity and information access, facilitating improved communication, access to services, and market participation. With the ability to communicate more efficiently and access essential information such as prices, weather forecasts, and agricultural best practices, consumers can make more informed decisions, optimize resource allocation, and enhance their overall well-being.

Moreover, mobile phones serve as a catalyst for financial inclusion, enabling individuals in underserved and remote areas to access formal financial services such as mobile banking and microfinance. By providing a convenient platform for conducting financial transactions, saving money, and accessing credit, mobile phones help bridge the gap between the unbanked population and the formal financial system, fostering greater financial resilience and empowerment among marginalized communities. For producers and entrepreneurs, mobile phones offer invaluable tools for enhancing productivity, market access, and business efficiency. Through mobile-based platforms and applications, smallholder farmers can access market information, connect with buyers, and negotiate prices more effectively, leading to improved market outcomes and higher incomes. Similarly, micro-entrepreneurs and small businesses can leverage mobile technology to streamline operations, manage inventory, and reach a broader customer base, driving business growth and economic prosperity. Furthermore, the proliferation of mobile phones stimulates innovation and entrepreneurship, creating opportunities for local developers, startups, and tech-enabled enterprises to harness the potential of mobile technology to address societal challenges and drive inclusive economic growth. By fostering an ecosystem of digital innovation and entrepreneurship, mobile phones contribute to job creation, skills development, and the emergence of vibrant digital economies across sub-Saharan Africa. Increasing awareness and incentivizing the unbanked population to embrace the formal banking system is crucial in leveraging the potential of mobile technology for financial inclusion. However, challenges such as low incomes, illiteracy, and limited network coverage present significant barriers to mobile phone adoption and usage, particularly in underserved areas of the continent. The pervasive issue of low incomes underscores the importance of making mobile banking services affordable and accessible to individuals across all income levels. Governments and regulatory authorities can play a pivotal role in addressing this challenge by implementing policy reforms aimed at reducing taxes and fees associated with mobile phone usage, thereby lowering the overall cost burden for consumers. By fostering a conducive regulatory environment and promoting competition among mobile service providers, policymakers can encourage investment in network infrastructure and service delivery, ultimately expanding access to mobile banking services for marginalized communities. Illiteracy poses another barrier to mobile phone adoption, as individuals with limited literacy skills may face challenges in navigating mobile interfaces and understanding financial transactions. To address this issue, initiatives focused on digital literacy and financial education can empower individuals with the knowledge and skills needed to effectively utilize mobile banking services. By partnering with local organizations, schools, and community centers, governments and development agencies can implement tailored educational programs that promote digital literacy and financial inclusion among underserved populations. The issue of network coverage and signal black spots presents a significant challenge, particularly in rural and remote areas where access to mobile connectivity is limited. Governments and telecommunications regulators can address this issue by incentivizing private sector investment in network infrastructure expansion and rural connectivity initiatives. By providing subsidies, tax incentives, and regulatory support, policymakers can encourage mobile operators to expand their coverage footprint and deploy innovative solutions such as satellite technology and community network initiatives to bridge the digital divide. Indeed, fostering partnerships between banks, financial institutions, mobile financial institutions (MFIs), and mobile industry players is essential for driving the adoption and expansion of mobile banking services across Africa. By leveraging the strengths and expertise of each stakeholder, these collaborations can accelerate the development and deployment of innovative mobile financial solutions that meet the diverse needs of underserved populations. Banks and financial institutions bring extensive experience in banking operations, regulatory compliance, and risk management to the table. Through partnerships with mobile industry players and MFIs, they can tap into the mobile ecosystem's technological capabilities and reach to deliver accessible and convenient banking services to remote and marginalized communities. By integrating mobile banking functionalities into their existing infrastructure and service offerings, traditional financial institutions can extend their reach and deepen their engagement with unbanked populations. Mobile financial institutions (MFIs) play a pivotal role in driving financial inclusion through mobile technology. These specialized entities are well-positioned to design and deploy mobile-centric financial services tailored to the needs of underserved communities. By collaborating with banks and leveraging their regulatory expertise, MFIs can expand their service offerings and reach new customer segments, driving greater financial inclusion and economic empowerment. Additionally, partnerships with mobile industry players such as telecommunications companies and mobile network operators (MNOs) are instrumental in expanding the reach of mobile banking services. MNOs possess extensive network infrastructure and customer base, making them key allies in reaching unbanked populations in remote areas. Through strategic partnerships with banks and MFIs, MNOs can integrate mobile banking functionalities into their existing mobile platforms, enabling seamless access to financial services for millions of users. Overall, fostering collaboration and partnerships between banks, financial institutions, MFIs, and mobile industry players is crucial for advancing financial inclusion and expanding access to mobile banking services in Africa. By pooling their resources, expertise, and networks, these stakeholders can drive innovation, scale solutions, and unlock the transformative potential of mobile technology to empower individuals and communities across the continent.

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