
**Financial Inclusion Through Digital Financial Services (DFS).
A Case of Liberia.**

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Abstract

The world of finance has long been shrouded in complexity, creating an impediment for the economically vulnerable and less powerful populations in developing and emerging economies who lack the resources or knowledge to access it. However, with the evolving digital landscape coupled with digital financial innovation, these barriers are beginning to crumble. From digital banking apps to mobile money platforms, digitization is revolutionizing access to financial services like never before. Digital financial services (DFS) have emerged as a critical enabler of financial inclusion, bridging the longstanding gaps in access, usage, and affordability of financial services that previously existed in traditional brick-and-mortar financial systems. In Liberia, where access to financial services is limited or unavailable for the population residing in rural and semi-urban areas of the country, digital financial services provide a vital lifeline for financial inclusion. Through a descriptive correlation quantitative research design, this study examines the impact of digital financial services adoption on financial inclusion in Liberia from 2011 to 2024. Using secondary cross-sectional data collected from the central bank of Liberia's annual reports (2016-2024) and the World Bank's Findex global database (2011-2024), the study results show a direct positive correlation between digital financial services and financial inclusion in Liberia, characterized by a shift towards digital financial services and an increase in banked individuals. The research findings also highlight that the adoption rate of digital financial services has increased considerably, thereby expanding financial inclusion in Liberia from 18.18% in 2011 to 52.21% in 2024. Notwithstanding, despite the DFS's potential to enhance financial inclusion in Liberia, the study identified several challenges and limitations hindering the widespread adoption of digital financial services in Liberia. These include inadequate digital public infrastructure (DPI), limited financial and digital literacy, security and privacy concerns, and regulatory and policy issues. Thus, the paper recommends that the Government of Liberia should augment Liberia's digital public infrastructure (DPI), strengthen the digital regulatory framework, enhance financial and digital literacy programs, and promote stakeholders' collaboration for more comprehensive financial inclusion through digital financial services in Liberia.

Keywords: Liberia, Financial Inclusion, digital financial services, digital financial inclusion digital banking, fintech, mobile money, Digital Public Infrastructure (DPI), innovation diffusion theory, Technological Acceptance Model (TAM), Liberia financial market, Liberia digital

banking, Liberia financial inclusion, Liberia fintech market, Liberia digital public infrastructure, Liberia digital financial services.

1. Introduction

Imagine that everyone in Liberia, from sellers in the bustling Saturday market in Sanniquellie, Nimba County, to farmers in the remote villages of Lofa County, had the power to save, borrow, invest and spend money with ease. This is the goal of financial inclusion in Liberia. Financial inclusion fosters sustainable economic growth and stability, promotes the economic empowerment of women, and contributes to poverty alleviation (World Bank, 2018). Financial inclusion is a stimulus for achieving seven (7) out of the seventeen (17) United Nations (UN) Sustainable Development Goals(SDGs. More importantly, financial inclusion is vital to the establishment and growth of an inclusive financial system (Ocharive et al., 2024).

Despite all these economic and societal benefits of financial inclusion, it has yet to permeated majority of the unbanked and underserved population in developing and emerging countries with limited access to financial services (Demirgüç-Kunt et al.,2016). Suggesting a gap between the availability of finance, its accessibility, use, and affordability amongst the world's population living in rural and sub-urban communities (Ozili, 2018; Ocharive et al., 2024; Demirgüç-Kunt et al.,2016). As put forward by Klapper et al. (2025), the ability to make and receive payments directly is a significant inducement for financial inclusion. Thus, access to financial services through financial inclusion starts with payments (BIS, 2020). Therefore, to expand financial inclusion in developing and emerging economies, wholesale and retail payment transaction accounts need to enable end users to meet most, if not all, of their payment needs and to store some value safely (FDS, 2024; BIS, 2020; Klapper et al.,2025).

On these premises, digital financial services have emerged as a promising solution to drive digital financial inclusion and address the affordability, documentation, and accessibility-related obstacles through digital banking and fintech products (Shaban et al., 2024). Digital financial services employed cost-saving digital solutions that positively impacted financial inclusion indicators (Ocharive et al., 2024; Shaban et al., 2024).

Digital financial services, powered by digital banking and fintech products, have the potential lower costs by maximizing economies of scale, increase the speed, security, and transparency of transactions to allow for more tailored financial services that serve the unbanked population and increase financial inclusion for all (Pazarbasioglu et al., 2020). Digital financial services can overcome the long-standing barriers to the limited access and usage of financial services faced by the unserved and the underserved population in developing and emerging nations by providing convenient access to faster, cheaper, and more customized services (Samkov,2019; Pazarbasioglu et al., 2020). Digital banking and fintech products, such as internet banking, ATM cards, mobile banking, and mobile money, can leverage high penetration among the populace residing in rural and semi-urban areas to deliver a wave of digital financial services, thereby fostering digital financial inclusion in developing nation like Liberia (Pazarbasioglu et al., 2020; Klapper et al., 2025).

Liberia has experienced rapid economic growth after 14 years of brutal civil war and economic meltdown that saw the country's Gross Domestic Product (GDP) fall by over 90% from approximately US\$1.2 billion in 1980 to less than US\$500 million by 1995, reflecting the economic devastation created by the war (Addy, 2023; Radelet, 2007). Since then, the country's GDP has increased to US\$4.75 billion in 2024, with a projected increase of 5.6% in 2025 (World Bank, 2024; CBL Annual Report 2024; Trading Economics, 2025; IMF, 2025). Nonetheless, a significant portion of the country's population still struggles with poverty, unequal access to economic opportunities, and income inequality, especially those residing in rural and semi-urban areas with limited access to financial services (Sida, 2024; Marie, 2021). However, only rural and semi-urban areas are lagging, while access to financial services is primarily concentrated in urban centers and among the political and economic elite (Sida, 2024; Marie, 2021). Thus, as explained by Ocharive et al. (2024), access to financial services for all is crucial to the establishment and growth of an inclusive economy, poverty reduction, and sustainable economic growth. Therefore, financial inclusion across all parts of Liberia would greatly enhance sustainable development and economic growth, which becomes increasingly pertinent and of utmost importance with the growing presence of digital financial services in Liberia.

According to the Central Bank of Liberia's (CBL) 2024 annual report, Liberia has more than 11.5 million registered mobile money account holders, with transaction volumes of 46.9 million and 14.8 billion in US dollars and Liberian dollars, respectively (CBL, 2025). As indicated in the CBL 2024 annual report, both the US\$ and Liberian dollar ATMs, Point of Sales (POS), mobile banking, and internet banking transactions volumes stood at 1.5million, 0.5 million, 0.4 million, and 0.06 million, respectively (CBL, 2025). The continuous growth and increased usage of digital financial services in Liberia have led to changes in the provisioning of financial services in the country's financial system and has provided a novel opportunity to the unbanked and underserved population in the country (Mpofu, 2024). A similar view is shared in the country's National Financial Inclusion Strategy (NFIS) (NFIS, 2024). Furthermore, according to the World Bank's 2024 Findex data, 52.21% of Liberia's population has a bank account, an increase of 187.18% from 18.8% in 2011 (Demirgüç-Kunt et al., 2021; Klapper et al., 2025). Digital financial services have been the main driving force behind this increase in Liberia's financial inclusion from 2011 to 2024. Digital financial services offers a promising avenue to broaden financial inclusion in Liberia by leveraging on digital banking and mobile money to provide access to financial services to the country's population with limited or no access to financial services (Lombeh, 2022; Pazarbasioglu et al., 2020).

However, despite the prospect for digital financial services to impact financial inclusion in Liberia, digital public infrastructures including internet access, financial and digital literacy, an insufficient digital regulatory framework, and effective stakeholders coordination remain significant challenges in the country (Lombeh, 2022; Charles, 2022). These limitations have the potential to hinder the proliferation of financial inclusion through digital financial services to the unserved and underserved individuals and businesses in the country, as they require a reliable internet connection, financial and digital knowledge, and the appropriate digital public

infrastructure to engage and effectively use digital financial services to boost financial inclusion in Liberia (Lombek, 2022; Charles, 2022).

1.1. Research Motivation

Financial inclusion, digitalization, financial innovation, and digital financial transformation are contemporary issues on the development agenda worldwide. Since 2010, the G20, the Alliance for Financial Inclusion (AFI), CGAP, and the World Bank have led the initiative for increased financial inclusion in developing countries, including Liberia, for poverty reduction and sustainable economic growth (Ozili, 2018). Today, the significance of financial inclusion through digital financial services for poverty reduction and sustainable economic growth is attracting the attention of policymakers, central banks, academics, and international development organizations (Frost et al., 2021; Ozili, 2018). Also, the United Nations (UN) 2030 SDG Digital Acceleration Agenda highlights the significance of digital financial services to address income inequality and foster financial inclusion (ITU, UNDP, 2023).

Hence, this study seeks to examine financial inclusion through digital financial services in Liberia by examining the impact of digital financial services adoption on financial inclusion in Liberia, employing a descriptive correlational quantitative research design method.

1.2. Gap and Related Work

Notwithstanding the growing body of literature on financial inclusion and, more recently, on digital financial inclusion (Agyekum et al., 2016; Iwedi, 2023; Kithinji, 2017; Adjei et al., 2023; Kumar, 2024; Del Sarto et al., 2025; Hamdan et al., 2021; Bawuah, 2025; Sabbaghi, 2025; Shaikh et al., 2023), a notable gap remains in country-specific studies that use descriptive correlational quantitative research design to examine financial inclusion through digital financial services. To the best of my knowledge, no prior studies have been conducted on financial inclusion through digital financial services in Liberia.

Additionally, while existing research has explored various determinants of financial inclusion, there is a lack of focused studies examining the role of digital banking, fintech products such as mobile money, and digital public infrastructure conditions on financial inclusion in a country context. Moreover, this study uniquely identifies and analyzes the potential link between traditional financial inclusion and digital financial services, a relationship that has not been thoroughly investigated in existing literature. By addressing these gaps, this research provides new insights into the evolving dynamics of financial inclusion, digital banking, mobile money, other fintech products, and digital public infrastructure in a country context.

1.3. Research Questions and Hypothesis

Two (2) Research Questions (R.Q.), and associated Hypotheses (H) will guide this study.

RQ1: How does digital banking financial services adoption in Liberia impact financial inclusion in Liberia? The current study is designed to pinpoint the correlational relationship between digital banking adoption and financial inclusion in Liberia.

Hypothesis 1- Digital banking financial services metric- Internet Banking, mobile banking, Automated Teller Machines(ATM) and Point of Sales (POS).

H1o: There is no direct positive correlation between digital banking adoption in Liberia and financial inclusion increased in Liberia.

H1a: There is a direct positive correlation between digital banking adoption in Liberia and financial inclusion increased in Liberia.

RQ2: How does mobile money financial services adoption in Liberia impact financial inclusion in Liberia? The current study is designed to pinpoint the correlational relationship between mobile money adoption and financial inclusion in Liberia.

Hypothesis 2- Mobile money financial services metric- registered subscribers, registered agent, mobile money transaction volume and value.

H2o: There is no direct positive correlation between mobile money adoption in Liberia and financial inclusion increased in Liberia.

H2a: There is a direct positive correlation between mobile money adoption in Liberia and financial inclusion increased in Liberia.

1.4. Significance of the Study

Hence, this paper contributes to the existing literature on financial inclusion, digital financial services, the Liberian fintech market, including mobile money operations, and the Liberian digital banking environment in several ways. The outcome of the study have important implications for policymakers, international development organization and practitioners in the field of financial inclusion, digital financial services, digital public infrastructure, the central bank of Liberia and the Government of Liberia.

1.5. Research Paper Structure

The paper is structured as follows. Section 1 presents an introduction of the study, while Section 2 reviews the literature related to financial inclusion, digital financial services, digital financial inclusion, as a conceptual framework, a theoretical framework, and an empirical review of literatures. Section 3 focuses on the Liberian context including financial inclusion and digital

financial services. While Section 4 discusses the methodology of the study. Section 5 presents the results and discussion, and Section 6 concludes with recommendations.

2. Literature review

The literature review section will be subdivided into three subsection, that is conceptual review, the literature review of the core theme for this study, theoretical review and empirical review.

2.1. Conceptual Review

In this subsection of the literature review, three themes will be explained, that is financial inclusion, digital financial services and digital financial inclusion.

2.1.1. Financial Inclusion

Inclusion in the financial system continues to be a core component of global socioeconomic development and national government agenda, particularly in ensuring that the economically vulnerable and less powerful groups in developing and emerging nations have reliable and affordable access to essential financial services (Klapper, 2024; Sikka et al.2024). Financial inclusion allows broad access to financial services that make a difference in people's lives by connecting them to the mainstream financial system, economic activities, and safeguarding them from adverse life circumstances that lead to extreme poverty(Sharma et al., 2025; Demirgüç-Kunt et al., 2016). Financial Inclusion spans a wide spectrum, running the scale from the wholly excluded who heavily relied on the cash economy commonly known as the unbanked, unserved or financially excluded, to the marginally included , who has mere expensive access to financial services usually referred to as the underserved, through to the super-included, who have access to a wide array of financial products and services (Leender et al., 2018).

2.1.1.1 Definition of Financial Inclusion

Numerous scholars and economic development experts have defined financial inclusion differently, often based on their specific field of study and perspective (Ocharive et al., 2024; Adjei et al., 2023; Hanning, 2010; CFI, 2013).

Ocharive et al.(2024) define financial inclusion as the wide range of financial services accessible and available to every individual, group, and business, especially those that are unserved and underserved from the formal financial system. On the other hand, Adjei et al.(2023) refer to financial inclusion as bringing the poor, marginalized, unserved, and underserved segment of a country's population into the formal financial system. Hanning (2010) describes financial inclusion as drawing the unbanked population into the formal financial system so that they have the opportunity to access financial services ranging from savings, payments, credit, investments, and insurance. Finally, the Center for Financial Inclusion (CFI) defines financial inclusion as a state in which a nation's populace has access to a full suite of quality financial services, provided at affordable prices, conveniently, with respect and dignity. Thus, the Center for Financial

Inclusion provides a summary of Ocharive et al. (2024), Adjei et al. (2023), and Hanning(2010) definition of financial inclusion.

The multidimensional definitions of financial inclusion above depict that financial inclusion focuses on access, use, quality of financial services, and welfare for the unserved and underserved populations in developing and emerging economies (Pesque-Cela et al., 2021; AFI, 2021). The access dimension implies availability and ability to use financial services with minimal barriers, while the use dimension refers to the actual usage of financial services products (Pesque-Cela et al., 2021; AFI, 2021). The quality dimension assesses whether the financial services product attributes match the target population's needs and, more importantly, how well informed and protected they are (Pesque-Cela et al., 2021; AFI, 2021). Finally, the welfare dimension, on the other hand, covers the impact of financial inclusion on the livelihood of individuals, businesses, and the national economy as a whole.

2.1.1.2 Measuring Financial Inclusion

As with the definition of financial inclusion, there is yet to be a consensus way to measure a country's financial inclusion level (Nguyen, 2021). Issues of financial inclusion indicators and measurements are a subject of growing concerns amongst international development organisations, policy makers, central banks, and researchers (Camara et al., 2014; Pesque-Cela et al., 2021). Financial inclusion is recognized as a crucial factor in sustainable economic development and growth, as it directly links the underserved and financially excluded to access to financial services, enabling them to save, invest, and benefit from credit (Nguyen, 2021;Rakibuzzaman et al., 2019). A formal consensus on how to measure financial inclusion indicators remains elusive, and issues of debate persist. When financial inclusion is measured effectively with reliable performance indicators using the appropriate survey instruments, it diagnoses the state of a nation's financial inclusion, identifies barriers, designs a national financial inclusion strategy, monitors policy impact, and agrees on future targets (World Bank, 2015).

There are various schools of thought on measuring financial inclusion, broadly categorized by their focused approaches on access, usage, quality, welfare, and multifunctional approach(Beck et al., 2007; Nguyen, 2020; Pesque-Cela et al., 2021; Camara et al., 2014; Korynski et al., 2016; AFI,2010; World Bank, 2015). Some authors and international development organizations emphasize access to and usage of formal financial services such as bank accounts, payment systems, and loans with indicators such as account ownership, transaction frequency, and reasons for non-participation as primary indicators (Pesque-Cela et al., 202; Beck et al., 2007). At the same time, others emphasize access to, usage, and quality of those financial services as the primary indicators for financial inclusion(Nguyen, 2020; World Bank, 2015b). Recently, from the perspective of policymakers and international development organizations, the degree of financial inclusion is measured from four main dimensions: access, usage, quality, and welfare (AFI, 2010; Korynski et al., 2016). Finally, the multidimensional approach to measuring financial inclusion incorporates the United Nations Development Programme (UNDP) and the

Human Development Index (HDI), which includes access, usage, and barriers to financial services as the primary indicator for financial inclusion (Camara et al., 2014; Nguyen, 2021).

In general, the review of literature discussed above shows that the measurement of financial inclusion is not only different in focused approaches, but the metrics selected to calculate the financial inclusion indicators or index are also different. However, this also opens the debate that these measures of financial inclusion indicators are necessary but not enough for the measurements of the degree of financial inclusion in a given economy. Notwithstanding the above, the World Bank's Global Findex database is regarded as the world's only comprehensive demand-side survey on financial inclusion and a leading source of data on how adults worldwide access and use financial services (World Bank, 2025).

The World Bank Global Findex, since its emergence in 2011, has provided valuable data on financial inclusion for researchers, policy makers, and various economies, including Liberia, on digital payments, savings, and borrowing behaviors across nations (World Bank, 2025). Finally, the Global Financial Inclusion Index measures how governments, financial systems, and employers promote financial inclusion, providing a more holistic view of the measurement of financial inclusion indicators for a country-specific study (World Bank, 2025). Hence, this study will use the World Bank Global Financial Inclusion Index measures for financial inclusion indicators to analyze the impact of digital financial services on financial inclusion in Liberia.

2.1.1.3 Barriers to Financial Inclusion

Efforts by international development organizations, policymakers, and national governments to increase financial inclusion over the years have led to meaningful progress, with a substantial decline in the number of adults without bank accounts (Klapper et al., 2025a; Maatallaha, 2024). According to the World Bank's Global Index 2021 report, the number of adults without access to an account has decreased from 2.5 billion in 2011 to 1.4 billion (Klapper et al., 2025a; Shirono et al., 2024).

Nevertheless, despite the significant progress made in financial inclusion in recent years worldwide, a large percentage of the global population still lacks access to basic financial services due to prevailing barriers and challenges to financial inclusion that continue to hinder the ability of the underserved and unbanked to access financial services and form part of the financial system (Pyypl, 2025; Maatallaha, 2024). As put forward by Sharma et al. (2023), more than 60% of the world's adult population in developing economies lacks access to essential and affordable financial services, including bank accounts, savings, loans/credit, and insurance. Furthermore, according to the United Nations' 2016 Human Development report, lack of access to financial services has been identified as a significant constraint to economic opportunities, inclusive financial system, and economic growth in developing and emerging economies (Jahan et al., 2016; Sharma et al., 2023)

Amongst these barriers and challenges are the mind-bogglingly enormous numbers of people residing in rural, semi-urban and remote villages that does not have bank account due to limited access to banking infrastructure, low financial and digital literacy, high cost of financial services,

and stringent regulatory requirements (Sikka et al., 2024; Ulwodi et al., 2017; Bhayana, 2024; Pyypl, 2025; Maatallaha, 2024) The problem is made much worse by the presence procedural sprints, like rigorous verification processes and convoluted documentation requirements (Sikka et al., 2024; Kaligis et al., 2018; Shirono et al., 2024). Moreover, in addition to these structural financial inclusion barriers and challenges, there are also deep-rooted cultural and social norms like discrimination against women for participating in formal financial activities (Ulwodi et al., 2017; Bhayana, 2024; Pyypl, 2025; Maatallaha, 2024; Kaligis et al., 2018; Shirono et al., 2024). Hence, digital financial services have emerged as a ray of hope in overcoming these barriers and challenges to financial inclusion hindering wider access to financial services to the economically vulnerable and less powerful groups in developing and emerging nations (Sikka et al., 2024). Digital financial services can empower the underserved and financially excluded to take control of their financial future right from the comfort of their homes and contribute to a more inclusive, equitable, and prosperous national economy (Sikka et al., 2024; Neves et al., 2023). Digital financial services, through digital banking and fintech products, can break down existing financial inclusion barriers that have prevented billions of people worldwide from accessing the formal financial services they need to improve their lives and achieve economic stability(Sikka et al., 2024; Neves et al., 2023).

2.1.2. Digital Financial Services (DFS).

As the adoption of technologies and internet connectivity continues, financial services are undergoing a profound transformation. Disruptive financial innovations such as mobile money, financial technology(Fintech), peer-to-peer, or marketplace lending, robo-advice, insurance technology (insurtech), and digital assets are reshaping payments, lending, insurance, and wealth management in the financial service ecosystem (Feyen et al., 2023; Appaya et al., 2024; Agyapong et al., 2021). Digital financial services have emerged, creating a level playing field in financial services delivery through the elimination of geographical, regulatory, socio-cultural , and affordability barriers that previously existed in the bricks and mortar traditional financial system (Feyen et al., 2023; Appaya et al., 2024). As explained by Neves et al. (2023) and Kambale (2018), digital Financial Services encompass a broad range of financial services accessed and delivered through digital channels, according to what they allow to perform, the nomenclature of the organization behind the financial service, and which functionalities are available, among others. Digital channels encompass the internet, mobile phones, ATMs, and nd POS terminals, among others Sharma et al., 2023; Natarajan et al., 2020; Neves et al., 2023). Digital financial services concepts include digital banking, fintech products, and digital currencies (Sharma et al., 2023; Natarajan et al., 2020; Neves et al., 2023; Kambale, 2018). However, this study will focus on digital banking and fintech digital financial services. Notwithstanding, digital financial services is still lacking a widely acceptable definition (Shofawati, 2019; Babarinde et al., 2020).

2.1.2.1 Definition of Digital Financial Services.

Various international development organizations and scholars have attempted to define digital financial services (DFS) (World Bank, 2019; Lyman et al., 2015; Wang et al., 2020; Kambale,

2018; Sharma et al., 2023; Pazarbasioglu et al., 2020; Kumar et al., 2019). Some of these definitions are reviewed and scrutinized below.

According to the world bank group, digital financial services are financial services that depends on digital technologies for delivery and access by consumers(World bank, 2019), Whiles the Consultative Group to Assist the Poor (CGAP) defined digital financial services as digital access to and usage of financial services suited and affordable to the needs of the financially excluded and underserved global population (Lyman et al., 2015; Wang et al., 2020). .On the other hand, Kambale (2018) states that digital financial services (DFS) include a broad range of financial services, namely, payments, credit, savings, remittances, and insurance, that are accessed and delivered through digital banking, mobile phones, automated teller machines, and point-of-sale terminals. Additionally, Sharma et al. (2023) and Pazarbasioglu et al. (2020) describe digital financial services (DFS) as Information and Communication technology-based services that rely on digital technology for the delivery, access, and usage of financial services by consumers. Finally, Kumar et al. (2019) digital Financial Services (DFS) defined as a set of financial services delivered and accessed through specific digital pathways. According to Kumar et al. (2019), digital Financial Services (DFS) are financial services provided through digital platforms, such as mobile phones, computers, Point-of-Sale (POS) terminals, and ATMs.

The above definitions of digital financial services focus mainly on the supply and demand side of digital financial services, which includes digital transactional platforms, retail agents, and end-users of DFS. However, while the emphasis of this study is on the end-users, that is, the poor, marginalized, and vulnerable population, access to and use of digital financial services, the study will also briefly examine the trends on the supply side of DFS namely; digital banking, fintech and the infrastructure through which digital financial services are deliver.

2.1.2.2. Digital Banking

As the world changes and adapts to technological advancements and social trends, so does the way we bank (Sarto et al., 2025). The pace and growth of digital banking and the use of digital channels more widely represent a paradigm shift in how we bank(Sarto et al., 2025; Faisal et al., 2024). As explained by Rakocevic et al.(2025), nothing has ever had such an impact on banking services as the use of digital technologies. Financial innovative technologies have changed the business model of banks to such an extent that they have completely disrupted it (Ahmad, 2025; Rakocevic et al., 2025). The banking sector has entered a new era for financial services by redefining the way individuals and businesses access and manage financial services (Ahmad, 2025). Digital banking not only provides access to financial services but also has profound implications for the implementation of financial inclusion in developing economies (Ahmad, 2025; Akenzua, 2025; Eyo-Udo, 2025). Digital banking merges traditional banking services with digital channels to streamline processes and enhance customer experiences (Ahmad, 2025; Rakocevic et al., 2025). Digital banking efficiency and convenience have significantly aided the expansion of financial services access in developing countries, particularly in nations with limited traditional banking infrastructure in rural and semi-rural areas. Thus, it brings about a

significant change in the financial services landscape, especially in supporting the creation of an inclusive finance system(Ahmad, 2025; Akenzua, 2025; Eyo-Udo, 2025).

According to Faisal et al.(2024), digital banking is referred to as the digitalization of traditional banking services. Digital banking encompasses the use of online, artificial intelligence, blockchain, cloud computing, and open API mobile platforms to deliver financial services in a seamless, efficient, and user-centric manner (Faisal et al., 2024; Eyo-Udo, 2025). With convenience and efficiency becoming buzzwords amongst consumers in the 21st century, digital banking has evolved as a disruptive component of traditional commercial banks' strategy (Faisal et al., 2024). Akenzua (2025) describes digital banking as the use of digital financial innovation to deliver banking and financial services through electronic platforms, such as mobile apps, online banking portals, and automated teller machines. As further explained by Akenzua (2025), these banking financial services include digital transactions, online fund transfers, loan applications, and remote account management.

2.1.2.3. Fintech – Financial Technology

The unprecedented increase in connectivity and global data flow in the digital landscape, led by the convergence of information and communications technology (ICT), digital innovation, and traditional financial services, has sparked significant shifts in the global economic landscape (Ajambo, 2024). These convergences have given rise to the financial technology market, known as the Fintech industry, which has introduced pioneering financial products and reshaped the delivery and access of financial services (Ajambo, 2024; Feyen et al., 2023).Fintech have transformed how individuals and businesses manage their finances and access financial services; they can now conduct transactions anywhere, anytime. With FinTech platforms, financial services are becoming accessible and affordable for both the unserved and underserved population in developing countries, such as Liberia, having a real effect on financial inclusion (Selvam et al., 2024; Ajambo, 2024; Sarto et al., 2025).

Globally, numerous fintech firms are offering digital financial services, leveraging their large customer bases and the data they have on transactions and activities that give rise to payments or a need for credit, insurance(Feyen et al., 2023). Hence,

the rise of FinTech companies in developing and emerging economies has significantly changed how households and businesses access and utilize financial services over the years (Daniel, 2023). From Liberia, where sending, receiving, and paying bills through mobile money is made easy with either Lonestar MTN MoMo or Orange money, to Kenya, where sending and receiving mobile money is made easy with M-Pesa, many are increasingly embracing the convenience and security of FinTech solutions (Daniel, 2023). Gone are the days of long lines at commercial banks or microfinance location, FinTech is allowing many people in developing and emerging markets to send and received mobile money instantly, pay bills and access microloans, buy and sell investment products all from their phones or personal computers thus having a real positive impact on financial inclusion (Daniel, 2023; Amnas et al., 2024; Lahrou et al., 2025). Moreover, the United Nations 2030 Agenda for Sustainable Development highlights the potential of a wide

coverage of FinTech adoption in developing and emerging economies to reduce financial exclusion, address income inequality, poverty reduction, and enhance economic growth (Care et al., 2025).

Fintech digital financial services includes mobile payments platforms, peer to peer lending and borrowing, crowdfunding platforms, insurance technology, regulatory technology and other digital payments platforms all which have the potentials to overcome traditional financial services barriers and research the underserved and financially excluded population (Sarto et al., 2025; Stfalcon, 2024). Fintech platforms, especially mobile payments platforms such as mobile money, are more critical in developing and emerging economies where everyday banking and payment infrastructure are underdeveloped or non-existent, thereby leaving a significant portion of the population with limited access or no access to financial services (Sarto et al., 2025; Ajambo, 2024).

So what is FinTech? Depending on who asks or your audience, FinTech can have a different meaning; for some, FinTech refers to the financial technology-based methods in the modern financial services market. For others, it implies a digital financial services or fintech firm that provides financial services through technology, while for some, it is just a digital financial ecosystem (Kerai et al., 2024; Azmeh et al., 2024).

Notwithstanding, the Financial Stability Board defines Fintech as technologically enabled digital financial innovation in the financial services that could result in new business models, processes, applications, and products with a substantial impact on the provision and delivery of financial services and the financial markets (FSB, 2024). Furthermore, according to Feyen et al. (2023), FinTech is advances in financial technology that have the potential to transform the provision of financial services, stimulating the development of new digital financial platforms, products, processes, and applications. The Bank for International Settlements refers to FinTech as a technology-enabled financial innovation in financial services that has transformed the financial system and the broader economy, impacting payments, monetary policy, and financial regulations. Finally, Grossman (2019) describes FinTech as a broader term that covers the utilization of technology to innovate and change various aspects of the financial industry.

The above definition suggests that the term FinTech is a combination of digital financial innovation, technological advancements, and the internet of things (IoT), aimed at delivering affordable financial services and products to end-users, enabling them to manage and use their money more effectively. Moreover, these definitions also distinguished FinTech from digital banking in terms of scope, purpose, customer focus, process, and technology. Digital banking accelerates the traditional banking process through digital channels, meeting individual and business demands and enhancing their experience within the scope of the core banking processes and activities. FinTech, on the other hand, identified gaps in the financial market and addressed them with improved business models and technology-enabled products and services that eliminate the need for financial intermediaries in the delivery of financial services.

2.1.2.3. Digital Public Infrastructures

Governments globally are heavily investing in the shared, horizontal digital infrastructures that support service delivery, foster innovation, and enable social and economic development known as digital public infrastructure (Levy, 2024; DPIAfrica, 2024). Digital public infrastructure (DPI) is the foundational digital capabilities provided by the national government to facilitate efficient and secure interactions within society (Levy, 2024). DPI serves as the digital building blocks and backbone, enabling government digital response to the growing digital landscape to boost financial inclusion and economic participation, and stimulates innovation across all sectors in a country (Levy, 2024). Digital Public Infrastructure encompasses elements such as digital identity systems, interoperable payment platforms, and data-sharing frameworks (DpiAfrica, 2024; Marin et al., 2025). As put forward by Dpi Africa, digital public infrastructures act as a foundational layer for digital financial services through the provision of the essential digital infrastructural system to expand digital financial services to the underserved and financially excluded communities (DpiAfrica, 2024; Clark et al., 2025).

Digital public infrastructure (DPI) is defined by the OECD (2024) as shared digital infrastructural systems that are secure, reliable, and interoperable, and that can support the inclusive delivery of and access to both public and private digital financial services. According to the United Nations Development Programme (UNDP), digital public infrastructure is the foundational digital building blocks that form the backbone of modern societies, enabling secure and seamless interactions between people, businesses, and governments (UNDP, 2025). DPI Africa depicts that digital public infrastructure is a digital infrastructure system, comprising secure digital identities, interoperable payment systems, and robust data sharing frameworks. This system serves as the invisible backbone behind digital transformation and supports digital financial services. Finally, Hadda et al. (2024) suggested that digital public infrastructure is the building block for developing transformative digital financial services that enable countries to provide economic opportunities safely and efficiently at a societal scale.

The digital public infrastructure definition implies that DPI is just as important as physical roads and railway networks, which connect households and businesses to jobs, services, and opportunities. Digital public infrastructure facilitates entrance to essential infrastructural systems that enhance connectivity and access to digital financial services, secure reliable identification, and support interoperability of digital financial service platforms, thereby bringing the underserved and unbanked population into the formal financial system.

Digital Public Infrastructure (DPI) supports the spread of DFS, the impact on developing economies, and the steps needed to continue this digital transformation (Dpi Africa, 2025; Marskell et al., 2024). Through enhanced connectivity and internet access, DPI facilitates the expansion of broadband and mobile internet connectivity, which is essential for digital financial services to the unbanked to promote financial inclusion (Dpi Africa, 2025; Marskell et al., 2024). Also, digital identification systems, a core component of DPI, provide a secure and reliable means for individuals to verify their identities when accessing and using digital financial services (Dpi Africa, 2025; Marskell et al., 2024; Animashaun et al., 2023). Digital public

infrastructure, by creating interoperability infrastructure, allows digital financial services platforms to make seamless transactions across different mobile money networks and between digital wallets and traditional bank accounts, thus creating an inclusive financial ecosystem where users can easily transfer money, pay for goods and services, and access a variety of financial products(Dpi Africa, 2025; Marskell et al., 2024; Animashaun et al., 2023).

2.1.3. Financial Inclusion Through Digital Financial Services (Digital Financial Inclusion).

Digital channel can be a drive for financial inclusion (Leedered et al., 2018). As explained by Klapper(2024), expanding access to financial services through digital channels and platforms is one of the core strategies for meeting United Nation Development Goals 8.10, which targets account ownership at formal institution including commercial banks, mobile money service providers and regulated micro finance organizations, a major component of financial inclusion. Hence, the increasingly widespread use of digital banking and fintech product has brought about a significant change in the financial services landscape thus, enabling the economically vulnerable and less powerful groups in developing and emerging nations to access and optimally utilize formal financial services (Ikmanila et al., 2025).From mobile money accounts accessible on basic phones to bank-account-linked wallets, digital financial services are fulfilling their promise of driving financial inclusion for the unbanked and underserved populations in developing and emerging economies (Klapper, 2024; Grossman, 2019; Toiny et al., 2025).

Digital financial inclusion, the digital access to and use of formal financial services has helped overcome the long-standing barriers faced by unserved and underserved individuals in remote areas in developing economies to access and use financial services (Grossman, 2019; Toiny et al., 2025; Lyman et al., 2015). Increased access to digital financial services has reduced remittance transaction costs, helping households share financial burdens, improve their resilience, and thus enhancing financial inclusion for all (Toiny et al., 2025). There are diverse definitions of digital financial inclusion by international development organizations, scholars, policy makers, and development economists.

The World Bank defines digital financial inclusion as the implementation of cost-saving digital channels to reach currently financially excluded and underserved populations with a range of formal financial services suited to their needs, delivered at a cost affordable to customers and sustainable for providers (World Bank, 2015).CGAP, using a development approach, describes digital financial inclusion as the digital access to and use of formal financial services by the excluded and underserved through digital banking, mobile money, and digital public infrastructure (Ozili, 2018;Neelam et al., 2022;Tshuma et al., 2023; Toiny et al., 2025). Thus, digital financial services address accessibility, affordability, and usage to overcome the obstacles and gaps in financial inclusion that previously existed in the traditional financial system (Mpfu, 2023). Hence, expanding access to finance services through digital channels such as digital banking, mobile money, and digital public infrastructure has proven to boost financial inclusion in developing and emerging economies.

2.1.3.1 Financial Inclusion through Digital Banking

The increased digitization of financial services has transformed the global banking market, offering innovative digital solutions to address financial exclusion in rural economies (Mookerjee et al., 2025; Liu et al., 2023; Mambu, 2022). Digital banking has emerged as a transformative force advancing financial inclusion for the poor and unbanked group in rural economies (Mookerjee et al., 2025; Liu et al., 2023; Mambu, 2022). As mentioned by Mambu (2022), the rise of digital banking financial services over the years has given commercial banks the opportunity and prospect of serving the financially excluded and underserved segment of the global population. Digital banking financial services revolution has not only bridged the infrastructural and geographical barrier challenges in financial inclusion, but has also impacted millions by extending access to and use of financial services to unserved and underserved populations (Mookerjee et al., 2025; Liu et al., 2023; Mambu, 2022).

Digital banking has been able to provide mobile banking apps, online banking platforms, ATMs, and POS payment services to consumers (Liu et al., 2023; Mambu, 2022). Digital banking financial services products have enabled further financial inclusion for those who found traditional ways of banking did not meet their needs, and were inaccessible to them (Liu et al., 2023; Mambu, 2022). With these digital banking products, previously unbanked people can now benefit from cheaper transactions and receive personalized financial services, thus allowing them to save money, pay their bills on time, invest, and plan for their financial future (Puntillo, 2024; Ahmad, 2025; Mookerjee et al., 2025). Digital banking has made financial inclusion not just a goal but a tangible reality for the underserved and financially excluded population (Puntillo, 2024; Ahmad, 2025).

Therefore, it is fair to say that digital banking, by providing accessible and affordable financial services through digital channels, has paved the way for financial inclusion and has gradually made its way into the mainstream in many places across the world (Puntillo, 2024; Ahmad, 2025; Mambu, 2022). In rural areas and remote villages, individuals and small and medium enterprises (SMEs) can now have access to and use of financial services with a few taps on their phones and other electronic devices at any time, anywhere, without the need to visit a physical branch, thus boosting financial inclusion for all (Ahmad, 2025). However, as rightly stated by Mookerjee et al.(2025), challenges and barriers such as limited financial and digital literacy programs, inadequate digital public infrastructures, regulatory and policy constraints, and stakeholder collaboration continued to hinder its full potential to reach the unbanked and economically vulnerable population. Nevertheless, as digital banking continues to evolve, coupled with strategic intervention, digital banking financial services hold immense promise for accelerating financial inclusion in developing economies, such as the Republic of Liberia.

Research by Melubo et al. (2020) and Mesud et al. (2025) supports the view that digital banking drives and promotes financial inclusion in developing economies. Melubo et al.(2020) studied digital banking and financial inclusion for women enterprises in Kenya. The study results revealed that digital banking has extensively promoted financial inclusion for women in Kenya by fostering affordable, timely, and adequate access to financial services in the region—Mesud

et al. (2025) qualitative research examining the role of digital banking in advancing financial inclusion. Their study's results show that digital banking facilitates financial inclusion by improving access to financial services, affordability, and convenience.

2.1.3.2 Financial Inclusion through Mobile Money

The widespread diffusion of smartphones, internet connectivity, and mobile technology have inspired mobile money digital financial services, fostering digital financial inclusion in developing economies (Shaikh et al., 2023; Appaya et al., 2024; Natarajan et al., 2020). A view supported by the World Bank Global Findex 2025 report. The report depicts that mobile money accounts are driving the increase in financial inclusion worldwide (Klapper, 2025). Take Liberia, for example Lonestar MTN MoMo and Orange Money have provided access to and use of financial services to the unbanked and underserved population in remote Liberian villages without bank accounts or any formal financial services. Mobile money financial services has empower these groups to digitally store, send, and receive money cheaply and pay bills through mobile phones (Bawuah, 2025; Hamdan et al., 2021). Mobile money services have brought a paradigm shift in the payment industry and are now widely considered an integral component of financial inclusion programs in developing and emerging economies (Shaikh et al., 2023).

Research by (Shaikh et al., 2023; Agarwal et al., 2023) defined mobile money as a digital multisided platform that provides financial services through mobile devices interface enabling individuals and business to use mobile money agent and internet connectivity to facilitates electronic transfers of fund and other financial services without requiring a linked to a bank account, credit card or debit card. According to Shaikh et al. (2023) and Agarwal et al. (2023), mobile money is highly regarded as an essential game changer in deepening financial inclusion. Academic literature(Sabbaghi, 2025; , Bawuah, 2025; Agarwal et al., 2023) supports the effect of mobile money digital financial services on financial inclusion.

In his study on mobile money, digital financial inclusion, and evidence on savings and borrowings, Sabbaghi (2025) conducted a cross-sectional regression analysis quantitative research using survey data from the Global Findex databases from 2021-2022, his study findings indicates a positive relationship between savings and borrowings in relationship to access to mobile money account across different countries in different income bracket. In examining the impact of mobile money on financial inclusion in Ghana from 2014 to 2021, Bawuah (2025)'s empirical results reveal that institutional quality and mobile money have a direct positive impact and significant effect on financial inclusion. Finally, Agarwal et al. (2023) quantitative study, based on a difference-in-differences design from random data collection of 151,771 people in 78 countries, argues that mobile money, by expanding credit access to end users, acts as a stepping stone to financial inclusion.

2.1.3.3 Financial Inclusion through Enabling Digital Public Infrastructures(DPI)

Digital Public Infrastructure (DPI) is the hidden engine for financial inclusion and an inclusive financial system (Levy, 2024). DPI is a crucial precondition for expanding digital financial service access and usage among the financially excluded and underserved. Thus, with the

increasing digitalization of financial services at an alarming pace, it becomes necessary for shared policies, horizontal digital public infrastructures that supports digital financial service delivery that promotes financial inclusion for the underserved and unserved populations (Hadda et al., 2024; Levy, 2024). Digital Public Infrastructure (DPI) plays an important role in enabling and expanding digital financial services to the unbanked, ensuring they reach even the most remote and underserved communities (DPIAfrica, 2024; Dhiman et al., 2025). Digital Public Infrastructure, by enhancing connectivity, providing secure identification, and enabling seamless transactions, drives financial inclusion and economic growth.

As African countries continue to invest in and expand their digital infrastructure, the future holds great promise for a more inclusive and prosperous continent (Hadda et al., 2024; DPI Africa, 2025; Dhiman et al., 2025). Digital Public Infrastructures by offering the core digital public infrastructures that facilitate service delivery across sectors, towns, and villages, DPI plays a significant role in closing the gap between connections and digital financial service delivery (Dhiman et al., 2025). Digital Public Infrastructure serves as an intermediary layer between physical infrastructure and digital financial inclusion by facilitating digital identification, connectivity and access, payment system interoperability, and data sharing exchange systems (Hadda et al., 2024; DPI Africa, 2025; Dhiman et al., 2025).

Digital Public Infrastructure spurs digital financial inclusion is a myriad of ways. DPI, by providing the essential building blocks that facilitate the delivery of financial services to a broader population expand access to digital financial services for even citizens in remote villages in developing countries (Hadda et al., 2024; DPI Africa, 2024). DPI frameworks have the potential to augment operational efficiency, reduce costs, improve affordability, and improve accessibility and scalability of digital financial services that foster widespread adoption DFS and financial inclusion. Hence, as governments, policy makers and regulators increasingly invest in Digital Public Infrastructures (DPI), it will reshape how digital financial services are designed, delivered, and regulated, thereby promoting digital financial inclusion (Hadda et al., 2024; DPI Africa, 2024).

2.2. Theoretical frameworks Review

The dawn of digital financial services has transformed traditional financial service delivery, bridging the financial services gap for the underserved and unserved (Liu et al., 2023; Tshuma et al., 2023). Theoretical frameworks, such as innovation diffusion theory, Technological Acceptance Model (TAM), and financial intermediation theory, explain digital financial innovation impacts on financial inclusion and an all-inclusive financial system (Davis et al., 1986; Wentzel et al., 2013; Marangunic et al., 2013; Adjei et al., 2023; Assidi et al., 2025; Rogers, 1962).

2.2.1 Innovation Diffusion Theory

The innovation diffusion theory developed by Everett Rogers explains how financial technological innovation, such as digital financial services, spreads across sectors, enhancing accessibility and usage amongst different social groups (Adjei et al., 2023; Assidi et al., 2025).

Adjei et al.(2023) and Assidi et al.(2025) explain that diffusion of innovation theory has five steps, namely, awareness or knowledge, persuasion, decision, implementation, and confirmation, which are critical in determining financial innovation adoption rate as they influence users' decisions to adopt digital financial services to enhance financial inclusion.

2.2.2 Technological Acceptance Model (TAM)

The Technological Acceptance Model (TAM) was first presented by Davis in 1986. The Technology Acceptance Model provides a vital theoretical framework in understanding the predictors of human behavior in accepting or rejecting digital financial innovations (Marangunic et al., 2013). The TAM framework has two factors that determine users' acceptance and rejection of digital financial innovations, namely perceived usefulness and perceived ease of use (Davis et al., 1989; Wentzel et al., 2013; Marangunic et al., 2013). The perceived usefulness refers to the degree to which an individual believes that adopting digital financial services will enhance their welfare. Financial performance whiles the perceive ease of use is regarded as the degree to which an individual, household or business believes that access and usage of digital financial services would be affordable and free of efforts (Davis et al.,1989; Wentzel et al., 2013; Marangunic et al.,2013). Thus, the Technological Acceptance Model provides a valuable framework on how individuals, households, and businesses perceive and ultimately decide to adopt digital financial services to promote digital financial inclusion in developing nations (Davis et al., 198; Wentzel et al., 2013; Marangunic et al., 2013).

2.2.3 Financial Intermediation Theory

Financial Intermediation Theoretical framework is based on the agency and information asymmetry theories (Kithandi, 2025). The financial intermediations theory illustrates how the emergence of digital financial services disrupts the traditional financial system by introducing digital financial innovative, affordable, and easily accessible products such as digital banking and FinTech, thereby increasing the availability of financial services to the underserved and financially excluded communities in rural and semi-rural areas in developing and emerging economies (Kithandi, 2025).

2.3. Empirical Review

Existing empirical literatures on financial inclusion through digital financial services broadly falls into financial inclusion though digital financial services (Agyekum et al., 2016), financial inclusion though digital banking (Iwedi,2023; Kithinji, 2017), financial inclusion through fintech (Adjei et al., 2023;Kumar, 2024; Sarto et al., 2025) and financial inclusion through mobile money (Hamdan et al., 2021; Bawuah, 2025; Sabbaghi, 2025; Shaikh et al., 2023).

With a time series secondary data on the volume of transaction on web banking, ATM, POS and Mobil banking extracted from the Central Bank of Nigeria statistical bulletin from 2009 to 2021, Iwedi(2023) empirical study test the effect of digital banking on financial inclusion in Nigeria. Iwedi(2023) study revealed that digital banking model significantly and critically influence Nigeria's financial Inclusion. And other quantitative study on the effect of digital banking

strategy on financial inclusion in Kenya by Kithinji(2017) shows that digital banking such as online banking, agency and mobile banking has a significant effect on financial inclusion in Kenya. Moreover, according to the author, there was significant positive change in financial inclusion over from 2012-2016 in Kenya financial system proxied by digital banking.

Sarto and Ozili explores how fintech is transforming financial inclusion in developing and emerging market using a bibliometric analysis with data collected from the Scopus database, Del Sarto et al.(2025) finding depicts that FinTech is significantly advancing financial inclusion in emerging and developing economies. Whiles Adjei et al.(2023), empirical research using Accra Ghana as a data collection point examines the effect of financial technology on financial inclusion in Accra. With random sampling of 353 respondent analyze using descriptive statistics and linear regression, the result of the findings shows that the introduction of FinTech has made more respondent to be financially included. In a quantitative research usings ordinary least squares and logistics regression model, Agyekum et al.(2016) examines the relationship between increased accessibility of digital financial services and financial inclusion in Ghana. The authors research results in difference in difference context shown that the digital financial services positively impact financial inclusion in Ghana.

Bawuah(2025) investigates the role of institutional quality in the relationship between mobile money and financial inclusion in Ghana from 2014-2021 with data collected form World bank financial indicator databased. Bawuah(2025) empirical research results reveal that institutional quality and mobile money have a direct positive and significant effect on financial inclusion in Ghana. Finally, Sabbaghi(2025) quantitative study using new survey data from the Global Findex Database from 2021-2022 results of the cross-sectional regression indicates a positive relationship between savings and borrowings in relation to access to mobile money account across different countries in different groups.

3. A Case of Liberia

Liberia, Africa's oldest republic, is a country on the West African coast covering an area of 43,000 square mile bordering Ivory coast to it east, Sierra Leone to its northwest, Guinea to its north and the Atlantic Ocean to it south and southwest (Ministry of Internal Affairs,2025; BBC,2024; Hinson, 2015). As of July 31, 2025, the population of Liberia stood at 5.7million, with a median age of 19 years (World meters, 2025). According to the Liberian Ministry of Internal Affairs, Liberia is divided into 15 counties, which are subdivided into districts, and further subdivided into clans. Liberia has over 20 indigenous languages, but the official language is English (Ministry of Internal Affairs, 2025). Liberia is one of the few countries in the world that uses a dual currency system, with Liberian dollars (LRD\$) and United States dollars (US\$) serving as legal tender nationwide (Menkulasi et al., 2009; Chen et al., 2022; Rush, 2025).

3.1 Liberia Economic Outlook and Financial System

3.1.1. Liberia Economic Outlook

Liberia is a country in transition, on a path to long-term development following the end of its 14-year brutal civil war and economic turbulence in 2003. In 2012, as a progressive step towards sustainable economic development and to rebuild the economic devastation caused by the prolonged civil war, President Ellen Johnson Sirleaf led the government developed the Liberia Vision 2030 framework (IMF, 2021; Trade Finance, 2020; MOF Liberia, 2025). Liberia Vision 2030 framework is a long-term development plan to transform the nation into a more prosperous and inclusive financial system for sustainable economic growth (IMF, 2021; Trade Finance, 2020; MOF Liberia, 2025). Since then, the government of Liberia have prepared various medium term strategic plans to support the implementation of Liberia Vision 2030 framework including Medium-Term Growth and Development Strategy (MTGDS) for 2013-2017, the Pro-Poor Agenda for Prosperity and Development(PAPD) 2018-2023 and the recently launched Liberia's ARREST Agenda for Inclusive Development(AAID) 2025-2029 (IMF, 2021; Trade Finance, 2020; MOF Liberia, 2025). The implementation of these medium-term strategies over the years have, along with its bold roadmaps for peace, have led to significant improvements in the country's economy since the end of the civil war in 2003 (World bank,2025a). As per the Central Bank of Liberia's 2024 annual report and the World Bank's review of Liberia's poverty reduction strategy, the country's economy is displaying progress, economic resilience, and growth when compared with other developing economies(World Bank, 2025a; CBL, 2025).For. instance, in 2024, the Liberia recorded an economic growth rate of 4.8 percent, a 4.6% increase from 2023, with a further expansion projected in 2025 of 5.6% (World Bank, 2025; CBL, 2025).

3.1.2. Liberia Financial System

Liberia's financial system is primarily cash-based, with limited access to the traditional banking system, especially in the rural and semi-urban areas, due to unreliable transport networks and other public infrastructure (US Department of State, 2023; AfDB, 2022; Jacketeh, 2024). Liberia's financial system is under the purview of the Central Bank of Liberia, which oversees banking, monetary policy, and other financial institutions in the country's financial system (US Department of State, 2023; AfDB, 2022). Liberia has a comprehensive financial system, primarily made up of banks and Non-Bank financial institutions that are regulated by the Central Bank of Liberia (CBL) (AfDB, 2022; CBL, 2025). As at December 31, 2024, Liberia financial ecosystems consists of nine(9), commercial banks, fourteen (14) credit only microfinance institutions, three(3) deposit taking microfinance institution sixty-one(61) licensed money remittance business, two hundred and sixty-four licensed foreign exchange bureau, twelve (12) Rural Community Finance Institutions(RCFIs), two (2) mobile money operators, one(1) development finance company, Nineteen (19) insurance companies, approximately one thousand four hundred and fifty (1450) village saving and loans (VSLAs), and one hundred and thirty-four(134) (CBL,2025; NFIS, 2024)

Commercial banks are the main financial institutions in Liberia's financial system, with a high concentration in the capital city, Monrovia, due to limited physical access, such as branches,

which continues to restrict their ability to serve the rural and semi-urban parts of the country (CBL, 2025). In line with the pillars laid out in both the 2018 and 2024 NFIS, the Government of Liberia, via the Central Bank of Liberia, has made progress in scaling up digital financial services, primarily in urban areas (NFIS, 2024; NFIS, 2018). The progress in the uptake of digital services is reflected in an increase in mobile money adoption and digital banking e-services (CBL, 2025; Marie, 2021a).

3.2. Liberia Financial Inclusion

Liberia's infrastructure and institutional framework for accessing financial services were badly destroyed during the 14-year brutal civil war and economic turbulence (Radelet, 2007). Thus, access, uptake, and usage of formal financial services were negatively affected (Marie, 2021a). Since then, the Government of Liberia, under the hospices of the Central Bank of Liberia, has undertaken developmental policy initiatives, including strengthening the financial system through increased capitalization and reserves requirements and other strategic efforts (Yates, 2025; NFIS, 2013; NFIS, 2028; NFIS, 2024). Each focusing on increasing financial access to all and strengthening different areas of the country's financial ecosystem (NFIS, 2013; NFIS, 2028; NFIS, 2024). However, despite success in this initial intervention, including the expansion of banking services in Liberia through the growing number of commercial banks and other non-banking financial services, access to financial services remains critically handicapped for an expansive financial inclusion for all Liberians; thus, a significant portion of the country's population remains underserved and financially excluded from the Liberia financial system (NFIS, 2013; NFIS, 2028; NFIS, 2024).

Nonetheless, over the last decade, there have been many strategic efforts specifically focused on access to financial services for unbanked and underserved population in rural, semi-urban and remote villages in Liberia to improve financial inclusion and an all-inclusive financial system. In 2010, the Central Bank of Liberia became a member of the Alliance for Financial Inclusion (AFI) and thereafter have produced and implemented three national financial inclusion strategies - 2009-2013, 2014-2018, 2024 (NFIS, 2013; NFIS, 2018; NFIS, 2024).

The National Financial Inclusion Strategy (NFIS) between the period 2009-2013, aimed at establishing a sustainable microfinance industry and physical public infrastructure to enhance access to finance services to the economically vulnerable and less powerful groups in the rural, semi-urban and remote villages in Liberia (NFIS, 2013). While the 2014-2018 National Financial Inclusion Strategy (NFIS) focused was to advanced inclusive growth and delivered access to financial services more broadly thereby, contributing to a more inclusive financial system that addresses poverty alleviation and sustainable economic growth (NFIS, 2018). Finally, the just-ended National Financial Inclusion Strategy (NFIS) for the period 2020-2024 upscaled from the progress achieved with the National Financial Inclusion Strategy (NFIS) from 2009- 2018 to address remaining challenges and build a sustainable, inclusive financial sector that is deeply rooted in digital financial services (DFS).

The National Financial Inclusion Strategy (NFIS) thus far has served as an effective tool to define and chart the course for advancing financial inclusion in Liberia. Defining Liberia's financial inclusion objectives, identifying obstacles, opportunities, and devising action plans to tackle barriers and gaps impeding Liberia's overall financial inclusion agenda. Hence, as a result of all these efforts by the Government of Liberia, Liberia as a nation has made significant strides in financial inclusion. As per the World bank 2024 Global Findex data, in 2024, 52.21% of Liberians age 15+ have account with a commercial bank or with a GSM mobile money operator, a slight increase from 51.63% in 2021, but lags behind the sub-Saharan Africa (SSA) region average of 58.18%, Nigeria(63.26%), Ghana (81.24) but above Sierra Leone (38.62%). Digital Financial Services (DFS), particularly mobile money, have been the driving forces behind these movements in Liberia's Financial Inclusion.

3.2. Digital Financial Services in Liberia

The digitization of cash payments is growing in Liberia, holding a positive promise for its citizens, especially those in the rural areas and remote villages (Himanshi et al., 2023). In Liberia, the use of mobile phones and other electronic devices for payments of goods and services stood at 50% in 2024, a significant increase when compared to 2011 (Klapper et al., 2025b). Digital Financial Services (DFS) is indeed permeating the Liberian financial system and fitting well with the country's financial inclusion agenda (CBL, 2021; NFIS, 2018, NFIS, 2024). Prior to the Ebola outbreak in 2014, the Liberian financial services ecosystem was poorly supported by an ineffective digital landscape (AFDB, 2022). The central bank of Liberia's ongoing focus on digital financial services to digitalize Liberia's payment systems is a promising step towards creating an inclusive financial system that subsequently, augment country's financial inclusion(NFIS, 2024; Yates, 2025). Liberia national financial inclusion agenda's thrust from 2014 to 2024 has been digital financial services, supporting the digitization of both retail and wholesale payments to increase access, uptake, and usage of financial services to the nation's underserved and financially excluded citizens (CBL, 2024). These realization and moves by the central bank of Liberia is crucial taking the potential positive effect digital financial services has on financial inclusion (Klapper et al., 2025b)

Digital financial services, including digital banking and fintech products, continue to expand the delivery, access, and usage of financial services to the unserved and underserved segment of Liberia's population, thereby furthering financial inclusion in Liberia. Nevertheless, the access and usage of digital financial services in Liberia are still in their embryonic stage due to the slow development of digital channels, digital public infrastructures, and internet connectivity to incentivize digital financial inclusion (CBL, 2025). Currently, digital financial services providers are limited to a few commercial banks (Digital banking) and GSM mobile money providers. According to World Bank data on Liberia's digital connectivity in 2024, only 50.19% of Liberians used digital payment channels (Klapper et al., 2025b). Out of this percentage, only 6.03% use digital banking or fintech products for online store payments, 5.9% use digital banking or fintech products to pay their bills, only 11.63% access government services online, and only 13.47% have daily access online (Klapper et al., 2025b).

3.2.1. Digital banking in Liberia

The Liberian banking sector has undergone a remarkable transformation through digital financial innovation in recent years. Liberia is experiencing significant growth in the field of digital banking (CBL, 2024). Consumers in Liberia are modifying their behaviors and digital preferences in line with rise in digital banking strategies and financial services products (Marie, 2021). The Liberia banking sector has undergone significant changes to adapt to technological advancements, digital financial innovation, and evolving customer demands in the last two decades. The Banking operations in Liberia have evolved from the mere exchange of cash, cheques, and other negotiable instruments to the application of digital financial innovation to banking transactions known as digital banking. Through digital financial innovation, banks in Liberia are now able to offer convenient digital financial products and services to their customers, such as internet banking, mobile banking, point of sales (POS), Automated Teller Machines(ATM), along with debit and prepaid cards thereby supporting the CBL financial inclusion agenda (UBA Liberia, 2025; NFIS, 2024). Established banks like Ecobank Liberia, United Banks for Africa (UBA) Liberia, GTBank Liberia, International Bank Liberia (IBL), Bloom Bank Liberia, and Access Bank Liberia have played a central role in the Liberian digital banking ecosystem (UBA Liberia, 2025; Nassim-Smith, 2025). They have transformed their operations to include digital channels and offer a range of digital banking services to enhance an inclusive financial system that promotes financial inclusion in Liberia (UBA Liberia, 2025; Nassim-Smith, 2025).

Furthermore, the Payment Systems Act of 2014 and its amendments, the electronic payment regulation of 2020, have all provided the legal foundation and building blocks for the digitization of commercial banks in Liberia. Moreover, the implementation of the Real-Time Gross Settlements System (RTGS) and the Automated Check Processing/Automated Clearing House(ACH) have played a vital in the growth of digital banking in Liberia (FPA, 2025; Trade finance, 2024; NFIS, 2024). These digital banking payments systems have improved interbank liquidity management, enhanced the efficiency and speed of interbank settlement obligations, and reduced credit and settlement risks in the Liberia digital banking landscape

Hence, as per the Central Bank of Liberia's 2024 annual report, the value of US\$ e-money transactions increased by 4.76% to US\$959.32 million in 2024, up from US\$915.71 million in 2023. The volume of debit card transactions surged to 932,000 in 2024 from 33,000 in 2023, and the debit card transactions value increased significantly to US\$767.99 million from US\$25.06 million in 2023. In terms of ATM, the volume increased by 20.48% while the value decreased by 6.94% from US\$268.67 in 2023 to US\$250.02 million in 2024. Both the volume and value of Point of Sale (POS) transactions increased in 2024. The value rose from US\$40.15 million in 2024 to US\$54.88 million, representing a 36.7% increase (CBL, 2025).

Nevertheless, although significant progress has been made in digital banking adoption in Liberia, it continues to be limited by basic infrastructural constraints, including sporadic power supply, internet connectivity, and cybersecurity, which remains a critical concern in the Liberian banking system, despite ongoing investments by industry players to mitigate cyber risks (McNutt, 2016).

3.2.2. Liberia FinTech Market

The Liberia Fintech market, since its emergence in 2011, is experiencing rapid growth mainly driven by increasing mobile phone penetration, a growing demand for mobile money financial services, and the Central Bank of Liberia's efforts to promote financial inclusion and sustainable economic growth (Vasudha, 2024; Charles, 2022; Jacketeh, 2024). Mobile money digital financial services are gaining acceptance among the unserved and underserved in Liberia (Vasudha, 2024; Jacketeh, 2024). Mobile money financial services via mobile money agent network are available in all 15 counties in Liberia (CBL, 2025). As explained by Jacketeh (2024), the rise of mobile money and other fintech project, have provided a convenient and affordable means to access financial services in the country, thereby aiding the government of Liberia in achieving its financial inclusion goals.

However, while mobile network operators such as Lonestar MTN and Orange Liberia, offering mobile money financial services, remain the key players in the Liberia Fintech market, the broader fintech ecosystem is still in its nascent stage (Vasudha, 2024; Charles, 2022; Jacketeh, 2024). New entrants into the Liberian fintech market, such as TipMe Liberia and BnB Transfer Corp, have introduced innovative fintech products, but they are facing challenges in gaining market adoption (Vasudha, 2024; Charles, 2022; Jacketeh, 2024). Nevertheless, the central bank of Liberia has established regulations to govern mobile money financial services and digital financial transactions to ensure consumer protection and the stability of the Liberia fintech market. Also, to increase mobile transactions nationwide and removed the barriers for entry into the fintech market, CBL has approved the interoperability between Mobile Monye operators and Liberia commercial banks to boosted the transfers of funds from bank accounts to mobile wallets and vice versa (CBL, 2025).

The Liberia Fintech market has significantly impacted the Liberia financial system, providing greater accessibility, affordability and convenience for the underserved and financially excluded population in Liberia. As stated in the 2024 CBL annual reports, the Liberia FinTech sector recorded a higher growth in 2024 when compared with previous years (CBL, 2025). Mobile money Registered subscribers increased from 9.3 million in 2023 to 11.5 million in 2024. Also, the total number of registered agents expanded from 156,242 in 2023 to 231,038 in 2024, reflecting an improved agent network to support Liberia's growing Fintech market (CBL, 2025). Moreover, mobile money transactions volume and value showed consistent growth across both Liberian Dollar (LRD) and United States Dollar (USD) (CBL, 2025). The volume of transactions in USD transactions grew from 36.8 million in 2023 to 46.9 million in 2024, while USD transaction value rose from US\$3.47 billion to US\$4.68 billion, underscoring the increasing reliance on Fintech products and services for payments and remittances (CBL, 2025).

Nonetheless, despite the potential of the Fintech market in Liberia to heighten the Central Bank of Liberia financial inclusion agenda and contributes to the Liberia Vision 2030 framework, Vasudha(2024), Lombeh (2022), Charles(2022) and Jacketeh (2024) suggested that there are inherent structural digital infrastructural, regulatory and educational challenges that are critical to ensured continued growth of the Liberia Fintech market to enhance Liberia digital financial

inclusion. Their studies reveals that challenges such as poor digital infrastructure, limited access to formal banking services, internet connectivity, low financial literacy, and a predominantly cash-based economy are hindering the proliferation of the Liberian fintech market (Vasudha, 2024; Lombeh, 2022; Charles, 2022; Jacketeh, 2024).

3.2.3. Liberia Digital Public Infrastructure.

In the race toward a digitally connected world, Liberia is charting its own pathway one that is defined by resilience and inclusivity. At the heart of this journey lies Liberia digital public infrastructure(LDPI), the invisible systems from digital ID to digital payment system and open data exchange platforms that makes digital economies thrives (Levy, 2024).Digital Public Infrastructure (DPI) has emerged as a transformative force in governance, capable of modernizing public financial management (PFM), enhancing financial inclusion and service delivery, and fostering inclusive growth (Umarji et al., 2025).

However, Liberia currently faces constraints with a low level of digital public infrastructure including digital ID systems, interoperable payment systems platforms, and data sharing infrastructure (Umarji et al., 2025). As per Digital Public Infrastructure tracking map, Liberia is rated below par on the digital ID system, the digital payment system, and the data exchange system (Dpimap, 2025). Nonetheless, the government of Liberia has recently recognized the potential of Digital Public Infrastructure (DPI) to address the systemic challenges and barriers faced by the underserved and financially excluded population to access and use digital financial services in the rural and semi-urban parts of Liberia, the implementation of the country's National Financial Inclusion strategies(NFIS) and Vision 2030 frameworks.

Hence, regarding digital payment system infrastructure, the Government of Liberia has made efforts, supported by an international development organization, to strengthen the national digital payment and settlement infrastructure. Liberia is making progress in its digital payment system infrastructure. For example, in 2016, the Central Bank of Liberia launches the following digital payment system infrastructures including, the Real Time Gross Settlement (RTGS) system, Scripless Securities Settlement (SSS) system, Automated Clearing House (ACH), National Electronic Payment Switch (NEPS) to support Digital financial inclusion in Liberia (CBL, 2025; NFIS, 2024). Moreover, on July 28, 2025, the Central Bank of Liberia announced the launch of the amended NEPS, a bid to modernize Liberia's digital payment infrastructure, thereby promoting financial inclusion and reducing the nation's reliance on physical cash (Frontpage Africa, 2025). The CBL Governor Henry F. Saamoi stated that the amended National Electronic Payment Switch (NEPS) will serve as a centralized digital hub, enabling seamless interoperability amongst Liberia's commercial banks, mobile money operators, and other Fintech operators, thereby providing real-time visibility into Liberia's digital financial services (Frontpage Africa, 2025).

On Liberia digital identification (ID) infrastructure, the government of Liberia, via the National Identification Registry (NIR), is developing a national digital ID system to drive its digital economy and improve service delivery as per the 2011 National Registration Act(Perala,

2024;Kaaru, 2025). Furthermore, on April 8, 2025, President Joseph Nyuma Boakai, Sr., signed Executive Order No. 147, mandating all Liberian citizens and foreign residents to register with the NIR and obtain a National Biometric Identification Card, which will serve as the primary form of identification for accessing public services and private sector transactions (Toe, 2025). Also, in October 2024, the Liberia Telecommunications Authority (LTA) and the National Identification Registry (NIR), in a bid to enhance Liberia's digital ID infrastructure, signed a Memorandum of Understanding (MOU) to ensure every mobile user is linked to a verifiable government-issued ID (Gee, 2024;Ajibade, 2024). Furthermore, on March 24, 2025, the Ministry of Finance and Development Planning launched the US\$30 million World Bank-funded digital public infrastructure project, aiming to expand the country's digital ID coverage and establish a crucial digital ID infrastructure (Macdonald, 2025).

In reference to Liberia digital data exchange infrastructure, Open Ownership is supporting key government agencies and ministries in developing and operationalizing a regulatory framework and a digital system for collecting, storing, and sharing beneficial ownership information (Ime, 2025). In addition, Liberia's Minister of Foreign Affairs Mme. Sara Beysolow Nyanti recently signed a memorandum of understanding with the Cybastion Institute of Technology in the US, for a partnership aimed at establishing a new data exchange center and the addition of an underwater cable to bolster the nation's digital connectivity (Yadav, 2024).

Poor internet connectivity has been a deterrent to digital financial services as well as digital public infrastructure in Liberia. Thus, in June 2022, the US government's Digital Investment blended finance program partnered with the Kenya-based CSquared to establish a nationwide fiber network in Liberia, which is going to help connect one million Liberians to the web(Lomax, 2024; Csquare, 2024). These initiatives seek to construct a 350 km backbone crossing 13+ towns in Margibi, Bong, and Nimba counties, and connecting Monrovia to the Ivory Coast and Guinea borders, bringing internet access to as many as one million people (Lomax, 2024; Csquare, 2024).

The usage of digital financial services, such as digital banking and fintech products, especially mobile money, is growing, but the pace needs to be expedited. Although CBL has made significant strides in strengthening the legal and regulatory framework for digital payment channels, there is still a need for regulatory clarity, investment in technological public infrastructures, and collaboration with local and international stakeholders to unlock the potential of digital financial services as the gateway to financial inclusion for all Liberians.

4. Methodology

Digital financial services (DFS) have emerged as a critical enabler of financial inclusion, bridging the longstanding gaps in access, usage, and affordability of financial services that previously existed in traditional brick-and-mortar financial systems in emerging and developing economies. In Liberia, where access to financial services is limited or unavailable for the for the economically vulnerable and less powerful populations residing in rural and remote villages in

the country, digital financial services provide a vital lifeline for financial inclusion. This study assessed the impacts of digital financial services on financial inclusion in Liberia.

This study followed a quantitative research method. A quantitative research approach enables the examination of correlation trends and patterns associated with financial inclusion and digital financial services in Liberia.

4.1 Research Questions (R.Q.)

RQ1: How does digital banking financial services adoption in Liberia impact financial inclusion in Liberia? The current study is designed to pinpoint the correlational relationship between digital banking adoption and financial inclusion in Liberia.

RQ2: How does mobile money financial services adoption in Liberia impact financial inclusion in Liberia? The current study is designed to pinpoint the correlational relationship between mobile money adoption and financial inclusion in Liberia.

4.2. Research Design and Approach

A descriptive correlation research design was employed in this study. According to Devi et al.(2023), a descriptive correlational research design is a non-experimental research design that aids researchers in describing the relationship between two or more variables without manipulating them or making any claims about cause and effect. In a descriptive correlation research design, the researcher does not change any variable; instead, they watch and measure the variables of interest and then look at the patterns and relationships that emerge from the data. A quantitative descriptive correlation research design was employed due to its advantage in ascertaining the statistical relationship between digital financial services and Liberia's financial inclusion. Studies by Barry et al. (2019), Beauvais et al. (2014), and Saro et al. (2023) utilized a descriptive-correlational research design in their respective paper.

This study's research design approach is based on the trend analysis of secondary time series data from 2011 to 2024, which uses existing data sources to examine the influence of digital financial services on financial inclusion in Liberia. Hence, the research will analyze data retrieved from reputable international developmental organizations, government ministries, agencies, and other institutions in Liberia that have undertaken surveys and studies on financial inclusion and digital financial inclusion.

4.3. Data Collection Method

Ex-post facto secondary data analysis was used to acquire data for this research. Thus, the study utilize existing time series data and information gathered from indicated surveys, and datasets to examine the impact of digital financial services (DFS) on financial inclusion in Liberia from 2011 to 2024. These indicated surveys and dataset includes World Bank Global Findex database for extraction of Liberia's financial inclusion and digital financial inclusion variables, the Central

Bank of Liberia annual report is used to obtain data for Liberia digital financial services variables.

4.4. Digital Financial Services and Financial Inclusion Research Variables

Key financial inclusion indicators applicable to Liberia include account ownership rates (15+, women, men, and the poorest 40%), as well as the proportion of people who have borrowed money using a mobile money account. Regarding Liberia's digital financial services metrics, key digital banking indicators will be collected and analyzed, including internet banking, mobile banking, ATMs, Point of Sales (POS) values and volumes, mobile money registered subscribers, registered mobile money agents, and mobile money transaction volumes and values.

4.5. Data Analysis Techniques

This study's data analysis, employing a descriptive correlational research design, will incorporate trend analysis — a technique used to examine patterns, trends, and tendencies in numerical data over time. The study will examine the ex-post-secondary time series data from 2011 to 2024 on both Liberia's digital financial services and financial inclusion to identify recurring trends, patterns, cycles, and variations that may provide insight into the effect of digital financial services on Liberia's financial inclusion.

Therefore, the direction of this correlational effect can be either positive, negative, or zero correlation. The study will categorize it as a positive correlation if both digital financial services metrics and Liberia's financial inclusion metrics move in the same direction, indicating a direct relation between the increase in the digital financial services variable in Liberia and that of Liberia's financial inclusion. On the other hand, a negative correlation occurs when the variables change in opposite directions; for instance, the DFS trend increases over the period, while Liberia's financial inclusion decreases. It is a zero correlation when there is no linkage between DFS and Liberia's financial inclusion.

5. Results and Discussion

5.1 Descriptive Statistics

Descriptive statistics for Liberia's financial inclusion, specifically digital financial services, including digital banking and Mobile money, are displayed. The current scenario of financial inclusion through digital financial services is highlighted with tables and graphs below to analyze the correlational relationship between Liberia's financial inclusion and digital financial services from 2011 to 2024.

5.1.1. Liberia Financial Inclusion indicators

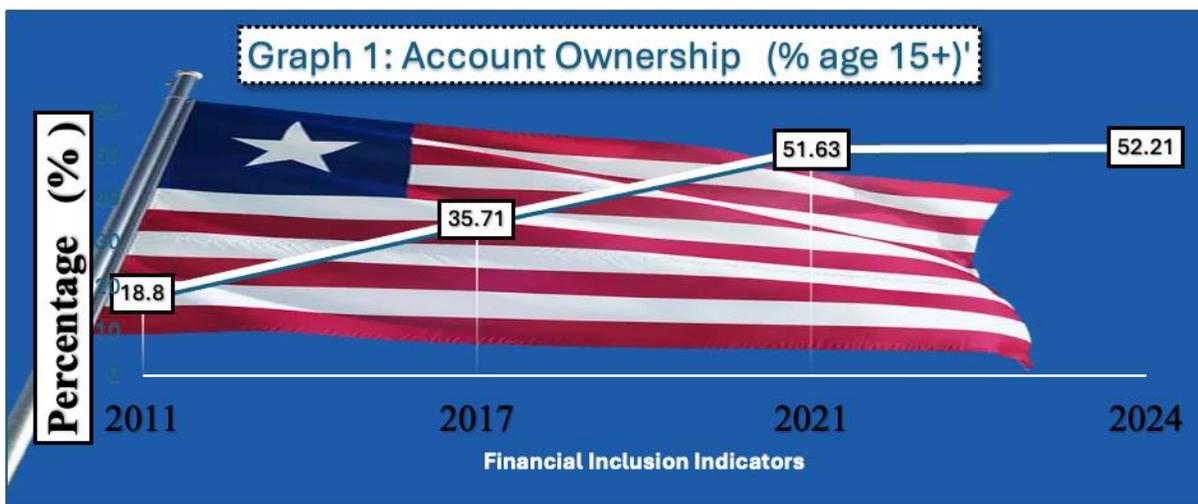
Table 1 and Graph 1 (Account ownership age 15+) provide descriptive statistics of Liberia's financial inclusion indicators, revealing a significant upward trend from 2011 to 2024. Liberia's financial inclusion increased by 178% from 2011 to 2024, with account ownership among individuals aged 15+. The graphical representation shows a significant positive growing trend in

financial inclusion in Liberia from 2011 to 2024, based on data obtained directly from the World Bank's Global Findex database. Moreover, account ownership in rural areas rose from zero in 2011 to 46.28% in 2024, thus showing an improvement in Liberia's financial inclusion agenda amongst the underserved and financially excluded population in rural and semi-urban areas of the country.

Table 1: Liberia Financial Inclusion 2011-2024

Financial Inclusion Indicators	2011	2017	2021	2024
Account Ownership (% age 15+)	18.8	35.71	51.63	52.21
Account ownership, poorest 40% (% age 15+)	-	26.6	42.1	43.01
Bank account Ownership, rural (% age 15+)	-	-	-	46.37
Bank Account ownership, Women (% age 15+)	14.68	28.16	44.2	46.28
Bank Account ownership, Men (% age 15+)	22.99	43.66	59.34	58.13
Borrowed money using a mobile money account, primary education or less (% age 15+)	-	-	14.82	12.11

Source: World Bank Global Findex database



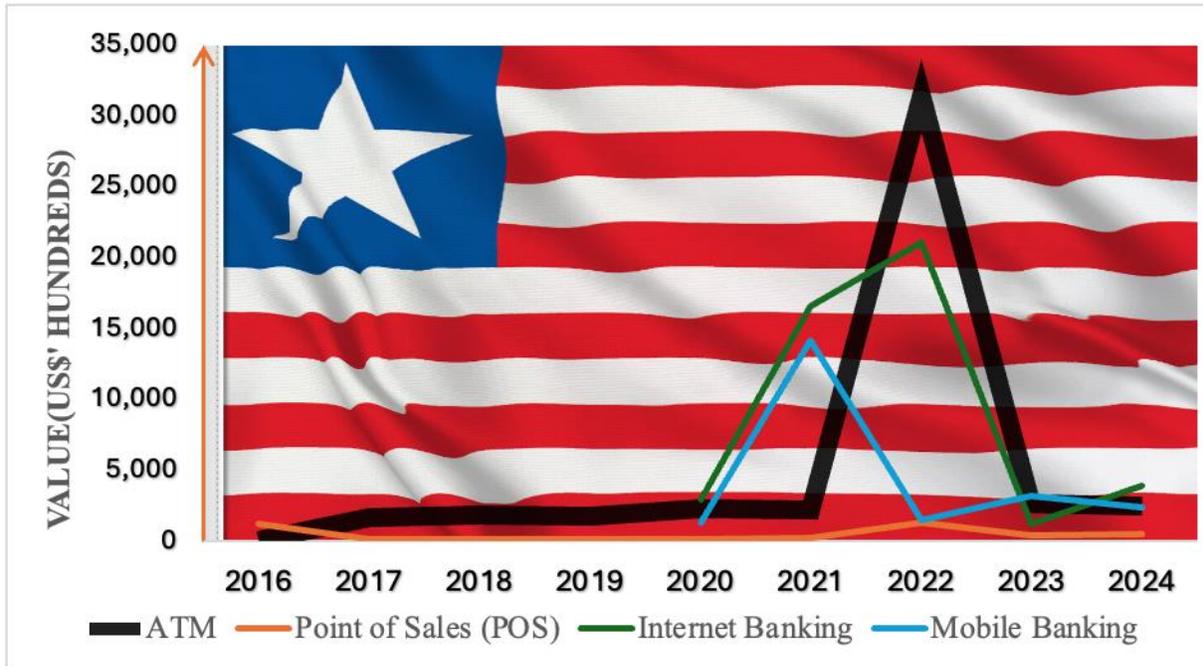
5.1.2. Liberia Digital Financial Services -Digital Banking-Data analysis

Digital banking has facilitated the establishment of banking anywhere, anytime and also at customers convenience in Liberia thus, enabling the poor, marginalized and vulnerable group in rural areas to access and used banking services without needing a physical bank branches. The

data on table and Line graph 2 illustrates the growth of digital banking in Liberia from 2016 to 2024. Digital banking financial services such as ATM, point of sales (POS), internet banking and mobile banking are growing year on year and becoming an integral part of financial transactions in Liberia. In the data presented in the tables and figures below, both the internet banking and mobile banking shows an increasing trend from 2020 to 2024. In 2022 in particular, digital banking financial services rose to its highest peak but fall significantly in 2023 and 2024.

Table 2: Liberia Digital Banking(DFS) US\$ Value(2016-2024)

Years	AMT	Point Sales(POS)	of Internet Banking	Mobile Banking
2016	6,466,622	123,044,948	-	-
2017	165,808,159	19,859,701	-	-
2018	183,796,582	19,160,087	-	-
2019	177,333,573	19,081,450	-	-
2020	230,913,564	19,839,866	297,155,598	137,067,270
2021	225,797,270	28,960,000	1,659,460,000	1,418,330,000
2022	3,144,990,000	134,050,000	2,110,290,000	149,840,000
2023	268,669,039	40,149,852	123,888,091	325,108,673
2024	250,002,000	54,880,000	396,800,000	241,310,000

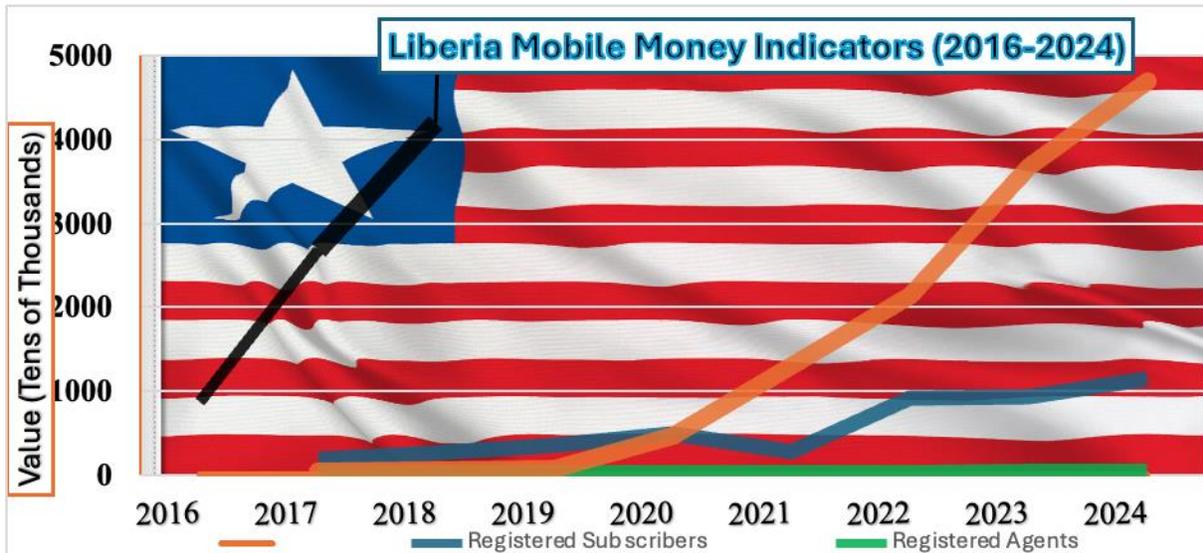


5.1.3. Liberia Digital Financial Services -Mobile Money -Data analysis

The data and figure 3 represent the evolution of mobile money service in Liberia from 2016 to 2024. Mobile money has been influential in increasing access and usage of financial services in Liberia especially in rural areas and remote villages where traditional banking infrastructure is limited or do not exist. In examining the trend and patterns within the dataset from 2016-2024, the number of registered subscribers and agents steadily increased reaching a peak of over 11 million registered subscribers and 0.23million registered agents. This indicates a growing number of individuals and business providing mobile money financial services , which contributes greatly to the increased availability of digital financial services in Liberia. Moreover, the volume and value of mobile money transactions also show a consistent rise, with the highest volume and value of mobile money transactions recorded in 2024.

Table 3: Liberia Mobile Money Indicators(DFS) (2016-2024)

Years	Registered Subscribers	Registered Agents	Transaction Volume	Transaction Value(US\$)
2016	-	-	-	8,710,461
2017	1,868,821	1,980	382,231	26,887,745
2018	2,708,627	6,995	553,204	42,043,762
2019	3,544,045	13,158	804,073	539,292,111
2020	4,916,758	30,506	44,758,752	276,732,626
2021	2,781,258	52,308	13,038,110	1,403,714,359
2022	9,248,817	109,081	21,424,405	2,209,843,740
2023	9,329,179	156,242	36,829,792	3,475,642,854
2024	11,513,131	231,038	46,924,126	4,686,796,019



5.2. Impact of Digital Financial Services on Financial Inclusion in Liberia

As a hypothesis, the results in Line graphs 1 and 2 show a direct positive correlation between the adoption of digital banking in Liberia and the increase in financial inclusion in Liberia. This outcome goes in the opposite direction to H1o but is consistent with H1a's prediction. The presence of digital banking, including internet banking, mobile banking, ATMs, and point-of-sale systems, provides insight into the scale of financial transactions facilitated through digital financial services. The upward trend in digital banking adoption in Liberia suggests increased

access to and usage of digital financial services in Liberia, effectively bridging the gap between underserved and unserved populations and the formal financial services, thereby increasing financial inclusion in Liberia (Table 1). Therefore, there is support for H1a, as the trend analysis between digital banking adoption and financial inclusion in Liberia reveals a direct positive correlation (Line graph 1 and 2).

The models shown in line graphs 1 and 3 provide results to answer Research Question 2 and its related hypothesis. The trend analysis corroborates that the emergence of mobile money platforms like Lonestar Momo and Orange money implies that the Liberians, throughout the 15 counties, can now easily transfer money, pay for goods and services, save, have access to credit and investments using their mobile devices anytime and anywhere, thus opening the door to an inclusive Liberian financial system for all. As stated in H2a, mobile money adoption in Liberia has a positive direct correlation with financial inclusion in Liberia. Hence, the results in graphs 1 and 3 support the predicted hypothesis H2a but are inconsistent with H2o. This suggests that the extent to which mobile money adoption influences financial inclusion in Liberia is positively correlated.

The impact of digital financial services on financial inclusion in Liberia is evident in the direct positive correlation between the growth of both digital banking and mobile money in Liberia and the corresponding increase in financial inclusion from 2011 to 2024. As illustrated above, digital banking and mobile money exhibit a strong positive direct correlation with financial inclusion. Highlighting the crucial role of digital financial services and their widespread availability in driving financial inclusion in Liberia. Digital financial services have effectively bridged the geographical gap in Liberia's financial system by providing access to and usage of financial services for the financially excluded and underserved segments in Liberia.

Thus, the increased adoption of digital banking and mobile money has also reduced the barriers to financial inclusion formerly faced by underserved and financially excluded populations in accessing and using financial services. These impacts are reflected in the rise of account ownership in Liberia, which stood at 52.21% as of December 31, 2024. In addition, the positive direct correlation between digital financial services and financial inclusion in Liberia will lead to a shift from cash-based to digital-based transactions, thereby promoting an inclusive financial system, sustainable economic growth, and the Liberia Vision 2030 agenda.

5. Conclusion and recommendations

5.1 Summary of Findings

From Liberia's first National Financial Inclusion Strategy (NFIS) in 2009 to the just-ended NFIS in 2024, financial inclusion for all Liberians has been a more than decade-long quest by the Central Bank of Liberia, with a primary focus to incorporate the underserved and financially excluded population into Liberia's formal financial system. This journey began with microfinance and credit unions and has now evolved to digital financial services (DFS). Digital banking and mobile money digital financial services are on the rise in Liberia's financial system,

particularly among the underserved and unserved populations in rural and semi-urban areas. One would rightly conclude that digital financial services are now a relevant platform to ensure the financial inclusion for all in Liberia.

Therefore, this research has explored the impact of digital financial services on financial inclusion in Liberia through a descriptive correlation research design using secondary cross-sectional data from 2011 to 2024 for data analysis. The study's findings revealed a direct positive and significant correlation between digital financial services adoption in Liberia and financial inclusion in Liberia. The research observed that as digital financial services increased from 2011 to 2024, financial inclusion in Liberia also increased by 187.18% from 18.8% in 2011 to 52.21% in 2024. The study findings further show that digital financial services have facilitated access, usage, and quality of financial services to the rural and semi-urban population in Liberia, enabling them to open bank accounts, pay for goods and services, save, borrow, and invest through digital platforms.

5.2. Challenges and Limitations

However, despite digital financial services' potential benefit and a promising solution to enhance financial inclusion in Liberia, several challenges and limitations are hindering the widespread implementation and utilization of digital financial services in Liberia, namely: Digital public infrastructure (DPI), financial literacy and digital skills, security and privacy concerns, and regulatory and policy concerns. Digital Financial Services (DFS) holds immense potential for transforming Liberia's financial system and expanding financial inclusion in Liberia. However, addressing the existing challenges and limitations hindering a wider expansion of DFS in Liberia is crucial for the successful implementation and widespread financial inclusion in Liberia. Thus, initiatives focused on DPI, financial and digital literacy, and adapting new or amending existing regulations are imperative to overcome these challenges and limitations to pave the way for a more inclusive financial system, financial inclusion for all that will aid the reduction of poverty in the country and achievement of Liberia Vision 2030 framework goals.

5.3. Recommendations and Policy Implications

Improvements on the impact of the digital financial services ecosystem on financial inclusion in Liberia require a multi-faceted policy approach. Thus, the government of Liberia must strengthen and build the digital public infrastructure, such as a digital ID, a more robust digital payment system infrastructure across the nation, and a data exchange system. Also, it is important for the government of Liberia, through various regulatory agencies, including the Central Bank of Liberia, to strengthen the Liberian regulatory framework governing digital financial services. That is, clear and supportive regulations that promote innovation, protect customer IDs, support interoperability, and foster a competitive environment.

Furthermore, to fully harness the benefits of digital financial services, the Liberian population, especially those in the rural and remote villages, needs the government to enhance financial and digital literacy programs. Most of the underserved and unserved populace lack the knowledge

and skills to access and use digital financial services effectively. Hence, government, mobile network operators, and other Fintech firms in Liberia should invest in a comprehensive financial and digital literacy program that educates individuals on the benefits, risks, and functionalities of digital banking, mobile money, and other DFS.

Moreover, the government of Liberia should promote collaboration amongst various stakeholders for increased impact of DFS on financial inclusion in Liberia. Policy makers, regulators, financial institutions, mobile network operators, other FinTech business operators, the international development community, and other relevant stakeholders should collaborate through data and information exchange to create an ecosystem supporting digital financial services implementation and adoption in Liberia. Finally, to leverage the potential of DFS in Liberia, reliable and affordable internet connectivity is needed. Access to reliable and affordable internet connectivity nationwide is essential for individuals to access and use digital financial services. The government of Liberia, through the Liberia Telecommunication Corporation (LIBTELCO) and other developmental organizations, should prioritize investments in expanding internet coverage in Liberia, particularly in rural, semi-urban, and remote villages.

Conflict of Interest

The author declares no conflict of interest regarding the publication of this research paper.

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