

Original Article

Financial Inclusion through Mobile Banking Technologies

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ABSTRACT

Financial inclusion is a key socioeconomic objective that ensures individuals and businesses can access formal financial services to support economic growth and financial security. Despite improvements in banking infrastructure, many people remain excluded from traditional banking due to geographical, economic, and social barriers. The rapid growth of mobile communication technologies has enabled mobile banking services to address these challenges by providing convenient access to financial services through mobile devices. Mobile banking allows users to perform transactions, transfer funds, pay bills, access savings, and receive financial information anytime and anywhere. It has significantly improved financial access for unbanked and underbanked populations, particularly in rural and remote areas, while reducing dependence on physical banking infrastructure and operational costs. This study examines the role of mobile banking technologies in promoting financial inclusion by analyzing their impact on accessibility, transaction efficiency, customer satisfaction, and economic participation. A literature review identifies key technological, economic, and social factors influencing mobile banking adoption, while a conceptual framework evaluates its contribution to accessibility, affordability, convenience, and security. The findings indicate that mobile banking enhances financial access, reduces transaction costs, improves financial literacy, and empowers marginalized communities. The study concludes that mobile banking is a transformative tool for inclusive financial development, though continued technological innovation, supportive regulations, infrastructure investment, and digital literacy initiatives are essential for maximizing its benefits.

KEYWORDS

Financial Inclusion, Mobile Banking, Digital Finance, Mobile Payments, Financial Services Accessibility, Digital Banking, Financial Technology, Economic Development, Mobile Money, Banking Innovation.

1. INTRODUCTION

1.1. Background

Financial inclusion is the ability of people or businesses to access financial products and services without facing any barriers based on their income, geographical location, gender or social background. It is very important in assisting in the economic development, the alleviation of poverty and overall quality of life of people by allowing them to save money in a secure way, obtain credit facilities, make payments, obtain insurance and manage financial risks. In many developing nations however, financial exclusion is still a great difficulty, especially in remote and rural areas where banking facilities are sparse and costs of opening physical bank branches are high. Consequently, the majority of poor people rely on informal financial markets, which are frequently insecure and opaque and do not offer financial opportunities. New opportunities have emerged from the speedy evolution of information and communication technologies (ICT), in particular mobile communication networks, to meet these challenges. Mobile banking technologies have proved to be a game changers by offering financial services via the mobile devices, allowing users to conduct banking transactions from anywhere, anytime. The rise of mobile phones in both urban and rural areas has created an opportunity for mobile banking to be an effective tool for financial inclusion, improving service delivery and driving inclusive economic growth. As a result, financial inclusion through mobile banking is being seen as a potent tool for sustainable socio-economic development, and to financial inequalities in financial access between different populations.

1.2. Importance of Mobile Banking Technologies

Mobile banking technologies are changing the financial services industry by allowing customers to conduct a variety of financial transactions using mobile devices. These technologies offer an easy-to-use, efficient, and affordable alternative to the traditional banking approach, avoiding many of the obstacles of the banking branch location. Mobile banking apps and digital platforms provide customers with access to financial services anytime, anywhere, creating a more inclusive, convenient banking experience. Mobile banking has played an important role in the expansion of financial inclusion, especially for people in remote and unbanked locations. The significance of mobile banking technologies can be explained with a number of advantages.



Fig 1 - Importance of Mobile Banking Technologies

1.2.1. Reduction in Transaction Costs

The decrease in transaction costs for financial institutions and customers is one of the greatest benefits of mobile banking technologies. Similar to traditional banks, traditional banking systems involve having to visit a branch, wait in line and use transportation to get there. Mobile banking can reduce many of these expenses because customers can do many of the same things they can do with a bank, but without having to go to a branch. Additionally, financial institutions can enjoy lower operating costs, stemming from the reduced reliance on the physical infrastructure and manual processing. As a result, mobile banking is helping to render financial services more affordable and accessible, especially to low-income people.

1.2.2. Increased Service Accessibility

Mobile banking enhances access to financial services, particularly because of its geographical and infrastructural convenience. People in rural and remote areas may struggle to obtain traditional banking services as they are not as widely distributed. Mobile banking is a type of internet banking that enables users to access banking services directly from their phone, without regard to the bank's location. Greater access facilitates greater involvement of people in the formal financial system and contributes to efforts to decrease financial exclusion of underserved populations.

1.2.3. Real-Time Financial Management

Mobile banking technologies enable users to access financial information and account management capabilities instantly. Users can easily check account balances, track transactions, move money, and get alerts about their finances. This instant financial information allows users to make well-informed financial choices, control their spending, and take better control of their individual finances. Real time financial management can help to improve budgeting, savings habits and financial health.

1.2.4. Improved Transaction Security

Security is a key to modern mobile banking systems. Encryption technologies, biometric authentication, one-time password, multi-factor authentication and fraud detection systems are examples of advanced security features that safeguard users against unauthorized access and financial fraud. These security measures provide users with greater confidence and trust in financial transactions, ensuring the integrity and confidentiality of financial information that is critical for digital banking. The enhanced security of transactions fosters trust in mobile banking and facilitates the secure growth of digital financial ecosystems.

1.2.5. Enhanced Customer Convenience

Mobile banking services provide unparalleled convenience, as they allow customers to access financial services at anytime and every day. Users are able to conduct banking transactions from the comfort of their homes, workplaces or on the move without limitations on banking hours or locations. With a mobile phone, you can make bill payments, recharge mobiles, transfer funds, check your account balance and much more quite easily and quickly. This makes it more convenient for customers, which can lead to greater satisfaction and increased usage of financial services.

1.2.6. Greater Financial Participation

Mobile banking technologies facilitate financial participation and can help people become active users of formal financial services. Because of its convenience, easy access to savings accounts, payment methods, credit and investment options encourages the users to become more involved in the financial system. Greater involvement enables greater financial inclusion, which can translate to increased financial assets, economic opportunities and financial security. Mobile banking plays a role in the broader economic development and inclusive growth as more and more people use digital financial services.

1.3. Financial Inclusion through Mobile Banking Technologies

The provision of financial services via mobile banking technologies is a major step forward in financial services distribution, especially for those that have been historically under-served by the formal financial system. Mobile banking involves the fusion of mobile technology and banking tools to provide a digital financial environment that allows individuals to access and control banking services from their mobile devices. With these technologies, individuals can conduct a variety of banking related tasks such as opening accounts and managing them, checking account balances, transferring funds, paying bills, depositing their savings, making applications for loans, and engaging in digital payment transactions. Services can be made available via mobile phone application, mobile wallet, web-based service, or SMS-based banking system, allowing access by users with different technical skills and Internet access. Another major role of mobile banking in financial inclusion is that it can bridge some of the traditional gaps that have hindered access to financial services. In many developing countries there are few physical banks and customers must travel great distances to access banking facilities. These pose difficulties in the speed and expense of financial transactions and make it less attractive to engage in the formal financial system. Mobile banking solutions provide a solution to these issues by allowing financial activities to be performed without sitting down at a desktop computer, whether at home, at work or in the community. This convenience not only cuts down on the cost of transportation, but also reduces waiting time and removes a lot of the logistical challenges involved with conventional banking. Additionally, mobile banking streamlines financial service delivery by minimizing paperwork and documentation needs with digital verification and electronic record management systems. Moreover, secure technologies like encryption, biometric authentication and one-time password verification provide added security in digital transactions and boost users' trust in mobile financial services. That means those who had been using informal financial transactions will now be able to take advantage of safe and regulated financial products. The mobile phone has gained widespread use, including in low income and rural areas, has further reinforced the importance of the role of mobile banking in the push for financial inclusion. Mobile banking can help people access savings, credit, insurance and payments, giving them increased control over their finances, and a greater ability to contribute to entrepreneurship and economic resilience. The use of mobile banking technologies therefore has the potential to significantly contribute to financial inclusion, economic empowerment and inclusive and sustainable economic development of various groups.

2. LITERATURE SURVEY

2.1. Evolution of Mobile Banking Systems

Mobile banking systems have developed as a result of the swift convergence of banking services and mobile communication technologies. In the early days, mobile banking was restricted to simple operations like checking your balance, receiving mini-statements and SMS alerts about transactions. As the mobile networks develop, smartphones and internet connectivity increased, extending banking processes to bill payments, loan applications, internet banking and mobile wallets, and even investment administration with a unique mobile app. Advancements in technology, like cloud computing, artificial intelligence, biometric authentication, and near-field communication (NFC), have contributed to further streamlining mobile banking platforms and improved security. The researchers have highlighted how mobile banking has changed conventional banking by changing the geographical boundaries, lessening the reliance on physical banking halls, and bringing financial services right to them. As a result, mobile banking has become a key enabler to financial inclusion, especially in rural and less served areas where traditional banking facilities are scarce.

2.2. Mobile Banking Adoption Factors

The adoption of mobile banking is influenced by a combination of technological, economic, social, and institutional factors that shape users' perceptions and behavioral intentions. Technological factors such as ease of use, system reliability, network availability, and transaction speed significantly affect user satisfaction and willingness to adopt mobile banking services. Economic factors, including reduced transaction costs, affordability of mobile devices, and financial savings achieved through digital transactions, encourage broader adoption among low-income populations. Social influences such as user awareness, digital literacy, trust in electronic systems, and recommendations from family and peers also play a crucial role in determining acceptance. Furthermore, institutional support through favorable government policies, regulatory frameworks, cybersecurity measures, and well-developed banking infrastructure strengthens consumer confidence in digital financial services. Existing studies consistently reveal that perceived usefulness, convenience, and security are among the most influential determinants of mobile banking adoption across different demographic and socioeconomic groups.

2.3. Financial Inclusion Outcomes

Technological, economic, social and institutional context may have an impact on the adoption of mobile banking because they affect the perceptions and behavioral intention of the users. Technological aspects like ease of use, system reliability, network availability and transaction speed have a significant impact on user satisfaction and mobile banking service acceptance. Low-income consumers are more likely to adopt mobile technologies because of cost-effectiveness of mobile devices, transaction costs, and financial savings from using mobile devices for transactions. Additionally, factors related to social influences, like awareness of users, digital literacy, trust in electronic systems, and family and peers' recommendations, are important that impact acceptance. In addition, favorable government policies, regulations, cyber security measures, and the development of banking infrastructure increase consumer confidence in the use of digital financial services. Previous research has consistently found that perceived usefulness, convenience and security are some of the most

important factors influencing mobile banking adoption by various demographic and socioeconomic groups.

2.4. Research Gap Analysis

Although there is a significant body of research on mobile banking adoption and usage, there are certain key gaps in the understanding of the full impact of mobile banking on financial inclusion. Much of the current research centers on user acceptance and the adoption of technology, but offers few efforts to evaluate the impact of mobile banking on key measurable financial inclusion outcomes including account penetration, saving practices, access to credit, and economic empowerment. Moreover, the research on the progress of the financial inclusion agenda is relatively scarce in the rural areas, low-income households and marginalized groups are the main beneficiaries of financial inclusion policies. There is also a lack of exploration of how the dimensions of service quality, such as reliability, responsiveness, security and user experience impact inclusion outcomes. In addition, the lack of standardized and integrated assessment systems hinders comparisons of findings from region to region and context to context. This explains why there is a need for a thorough analytical model that quantitatively assess the relationship between mobile banking technologies and financial inclusion performance, as this is the underpinning motivation of the current study.

3. METHODOLOGY

3.1. Research Framework

This study's research framework highlights the connection between mobile banking technologies and financial inclusion outcomes. The framework recognizes critical elements of mobile banking as stand-alone factors which impact on several components of financial inclusion as measured by the dependent variables. Mobile banking technologies offer end-users ease of access to financial services via electronic channels and facilitate transactions securely and efficiently, wherever they may be. The framework also assumes that better access, efficiency, availability and security of mobile banking services positively affects financial access, the use of financial products, participation in formal financial systems and economic empowerment. The study examines these relationships, to assess how effective mobile banking technologies are in driving inclusive and sustainable financial development.

3.1.1. Mobile Accessibility

Mobile accessibility is the ability of people to access a banking service using a mobile phone, for example a smartphone or a feature phone. It includes various aspects like device availability, internet connectivity, network coverage, and application interfaces. Increased mobile accessibility means there are fewer geographical and infrastructural constraints on access to financial services, especially in rural and remote areas. Mobile accessibility is important to reach and provide financial services to the unbanked and increase financial inclusion at all times and by all places.

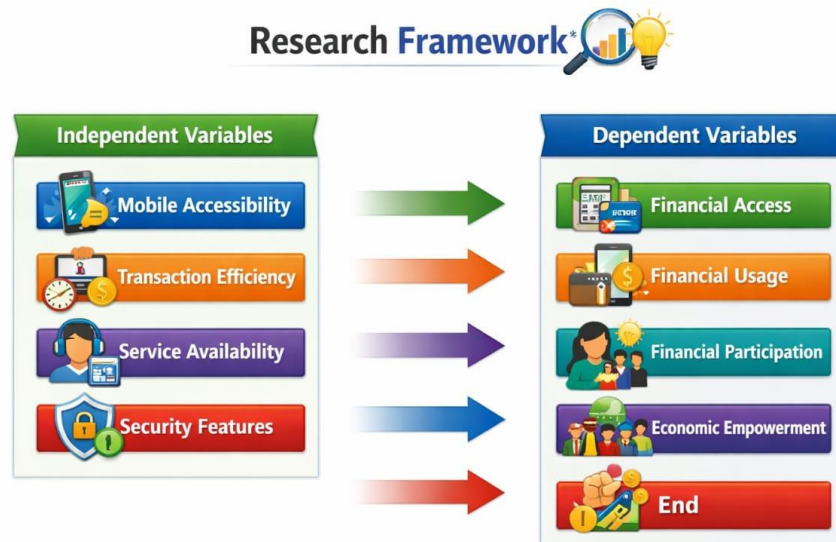


Fig 2 - Research Framework

3.1.2. Transaction Efficiency

Transaction efficiency is the capability of the mobile banking systems to execute financial transactions swiftly, accurately and conveniently. The efficient transaction mechanisms reduce processing times, waiting intervals and do not require the physical presence of the user in banking institutions. Instant transfers, instant payments, automated notifications, digital transaction capabilities, and so on improve user experience and drive more financial services usage. Moreover, the enhanced transaction efficiency plays a crucial role in fostering mobile banking adoption and shaping a financial system that is more inclusive.

3.1.3. Service Availability

Service availability is the degree to which mobile banking services are available to their customers at all times, without interruption. It encompasses aspects like system uptime, network reliability, 24/7 service delivery, and offering a variety of banking features via mobile apps. Availability of the services enable users to make transactions, access account information and use financial products at their own convenience. For people living in low-banking-service areas, this continual access can add to the trust placed in financial institutions and drive greater interest in formal financial services.

3.1.4. Security Features

Security means the technological and procedural measures taken to secure the users' banking information and their banking transactions in mobile banking systems. These measures include encryption technologies, biometric authentication, two-factor authentication, secure passwords, fraud detection mechanisms, and privacy protection protocols. Implementing robust security measures enhances user trust in digital financial services, reducing the possibility of cyberattacks, identity theft, and unauthorized access. Security is one of the most important challenges to mobile banking adoption and strong security is a critical component to build trust and adoption of mobile financial services.

3.1.5. Financial Access

Financial access is a measure of whether someone can access and use formal financial services, including savings accounts, payment systems, insurance products and credit facilities. Mobile banking helps to expand financial access and overcomes many of the physical and economic constraints of traditional banking. Mobile platforms enable customers to open accounts, make transactions and avail of financial services without being in the bank. Financial access is regarded as one of the main pillars of financial inclusion, especially for those groups that were not able to access the formal financial system.

3.1.6. Financial Usage

Financial usage indicates how often and how much people are using financial services they have available. Access measures the access to financial systems, while usage measures activities that involve financial systems, like making payments, borrowing, digital transaction, and saving. By enabling financial transactions that can be made easily, quickly and conveniently via mobile, mobile banking promotes the regular use of financial services. The higher the financial usage, the more the people are integrated into the formal financial sector and the better their financial situation.

3.1.7. Financial Participation

Financial participation, the participation of individuals and businesses in their participation in the formal economy in various financial activities. It encompasses having an active bank account, using electronic payment systems, saving and investing, and accessing credit facilities. By making financial processes easier and lowering barriers to participation in financial transactions, mobile banking helps to open up financial services. Improved participation builds the broader financial system with more users in formal financial transactions and encourages inclusive economic growth.

3.1.8. Economic Empowerment

Economic empowerment is the capacity to strengthen their economic situation by increasing access to finance and opportunities. In terms of the economy, mobile banking helps promote entrepreneurship and business transactions, influences savings habits and credit availability and financial information. People who are able to handle money well and derive financial services easily are better equipped to earn money, create assets and become financially independent. Therefore, economic empowerment is an important measure of the overall socioeconomic outcomes of mobile banking technologies for financial inclusion.

3.2. Data Collection Procedure

The method used for data collection in this study is aimed at getting comprehensive and reliable data on the effect of mobile banking technology on financial inclusion. A variety of primary and secondary data sources are used in order to fully understand the research problem. Primary data is gathered using structured questionnaires which are filled in by a wide range of respondents such as users in rural areas, users in urban areas, banking professionals and financial service providers. The questionnaires aim to collect data on the prevalence and extent of mobile banking usage, access to

mobile banking, transaction efficiency, mobile banking security beliefs and perceptions, service availability and impact on financial inclusion outcomes. Closed-ended and Likert scale questions are used to enable quantitative analysis and to assess the attitudes, experiences and satisfaction of respondents with mobile banking services. Along with primary data, secondary data is gathered from various authoritative sources like the banking report, government financial statistics, financial usage records of mobile banking, etc. The Banking Reports offer key insights into the adoption rates and transaction volumes, performance of digital services, and financial institutions' strategies. Government financial statistics provide data on the various financial inclusion indicators, account ownership, uptake of digital payments and economic development trends by demographic groups. The mobile banking usage records reinforce the analysis given the empirical evidence on transaction frequency, the utilization of services from the financial instruments, and the usage of the financial platforms. Target respondents are chosen as representatives of the various stakeholders in the mobile banking ecosystem. Rural users are added in to measure the role of mobile banking in enhancing financial inclusion in markets with few physical banks, and urban users are included to learn more about digital banking use in technologically advanced markets. Banking experts provide insight into operational issues, technological advancements and mechanisms for service delivery. Financial service providers, such as fintech providers and digital payment operators, share insights on innovation, approaches to customer engagement and growing digital financial services. These groups of respondents provide a balanced and comprehensive data set that can accurately capture the multiple dimensions of the connection between mobile banking technologies and financial inclusion. The data collection system used is systematic, which makes the results of the study valid, reliable, and generalizable.

3.3. Financial Inclusion Assessment Model

The Financial Inclusion Assessment Model developed in this study is meant to assess the effectiveness of mobile banking technologies in the financial inclusion of various population groups. Financial inclusion is a multi-dimensional phenomenon which goes beyond simply being able to access financial services; it also involves how those services are actually used and what kind of services are offered to the users. The study, to comprehensively capture these dimensions, uses the Financial Inclusion Index (FII), a quantitative index measuring overall financial inclusion performance. The index combines three important areas: Accessibility Score (A), Usage Score (U), and Service Quality Score (Q). The Accessibility Score reflects the ability of people to use mobile banking service, related to the existence of mobile device, internet connection, network coverage and existence of banking service via mobile devices. The Usage Score measures the extent and variety of financial transactions made via mobile banking apps, such as fund transfers, paying bills, savings, and other financial services. The Service Quality Score measures how reliable, secure, responsive and effective users find their mobile banking services. These three component scores are averaged to get the Financial Inclusion Index. The Accessibility Score, Usage Score and the Service Quality Score are simply summed and then divided by three. By doing so, this approach is a balance between the three dimensions of financial inclusion, with equal weightings applied to each dimension in the final index value. The higher the Financial Inclusion Index, the more likely users are to have access to mobile banking service, actively use it and receive good quality service. A lower index value, on the other hand, indicates obstacles to effective

financial participation. The model allows researchers and policymakers to compare levels of financial inclusion over time, by region, by demographic, etc. Moreover, it is useful for identifying areas for improvement and to support specific strategies and policies to promote financial inclusion through mobile banking technologies. The model is simple and comprehensive, enabling both practical tools for assessing the wider socio-economic impact of digital financial services and a foundation for informing policy and practice.

3.4. System Implementation Flow

The implementation flow of the system shows the steps of the sequential process by which mobile banking technologies enable financial inclusion. It starts with users enrolling themselves in the digital banking system, and then goes through a series of stages that allow users to access financial services, participate financially, and ultimately help achieve financial inclusion. All of the stages are important to ensure that users can access, use and benefit from mobile banking services securely. The flow illustrates how financial service delivery, financial infrastructure, and secure authentication work together to facilitate inclusive financial development.



Fig 3 - System Implementation Flow

3.4.1. Start

The implementation process starts with the starting of mobile banking system, where people are aware of the availability of digital financial services. Financial institutions, government agencies and service providers now strive to raise awareness and awareness campaigns, as well as customer contact about mobile banking at this level. The goal is to bring their potential customers, especially from underserved areas, into the formal financial system via a mobile platform.

3.4.2. User Registration

User registration is the first operational stage in the mobile banking process. In this phase, people establish a mobile banking account by entering their basic personal details, including name, contact information, ID details, and banking details. Registration can be done via a mobile application, online portal, banking agent or financial institution. The registration process should be straightforward and easy to use, particularly for those with limited tech-savviness and for first-time users.

3.4.3. Mobile Banking Access

If users complete the identity verification successfully, they would be able to access mobile banking services via secure digital platforms. This stage allows the customers to login to their accounts and avail of different banking services using their mobile device like a smartphone. With mobile banking access, customers can now use mobile banking services for managing their finances anytime and anywhere without depending on physical bank branches. Improved financial inclusion through financial access is of great advantage, especially in geographically remote areas.

3.4.4. Financial Transactions

The financial transactions stage is a point where multiple financial activities are carried out on mobile channels. Users can transfer money, pay utility bills, recharge mobile services, buy goods, receive them and make other financial transactions electronically. Mobile banking makes these transactions easier thanks to its quick, secure and efficient processing facilities. Digital transactions lower transaction costs, save time and increase the frequency of interaction with formal financial services.

3.4.5. Savings & Payments

This is when users are actively using mobile banking for saving and payment. Mobile banking applications often provide features such as digital savings accounts, recurring deposits, automatic transfers, and electronic payment systems. These services foster disciplined saving and enhance financial planning by the users. Moreover, digital payment systems enable smooth transactions of goods and services, thereby fostering a shift towards a cashless economy and improving financial management.

3.4.6. Financial Participation

Financial participation is defined by regular use of financial products and services, as well as active involvement of persons in the formal financial system. The number of people who participate in financial activities is growing as they engage in more payments, credit applications, investment and saving. Mobile banking reduces the access constraints that have made financial services inaccessible and can help people from all socioeconomic groups to be part of formal financial services. Enhanced participation leads to strengthening economic inclusion and to overall financial stability.

3.4.7. Financial Inclusion

Financial inclusion is the end goal of the system implementation process. By accessing mobile banking services on an on-going basis, people are presented with opportunities to save, transact, borrow, invest and effectively manage their finances. Financial inclusion increases economic

empowerment, diminishes financial inequalities and strengthens access to critical financial resources. Mobile banking is a strategic solution that can be used to reach the previously unbanked and underbanked masses and help achieve sustainable economic growth and social development.

3.4.8. End

Finally, the process leads to improved gains in financial inclusion, as people are successfully included in the formal financial sector and can fully access the financial services they have available. The end stage represents the achievement of the system's goals and outcomes, such as better financial access, higher service use, more economic involvement, and better economic health. The benefits of financial inclusion can be sustained over time, and spread to more segments of the population through continuous monitoring and improvement of mobile banking services.

4. RESULT AND DISCUSSION

4.1. Mobile Banking Adoption Analysis

The mobile banking adoption analysis shows that the adoption of mobile banking services has risen considerably among rural and urban populations. This expansion can be attributed to the increasing penetration of smartphones, better mobile internet access and better telecommunications infrastructure. With the wide availability of cheap smart phones and mobile data services, more people are able to use banking services via their mobile apps. Mobile banking has become a useful tool to provide financial services in remote places like rural areas where physical bank branches are sparsely distributed or are far from residential areas. Likewise, mobile banking has gained more ground among urban users as it is convenient, fast, and can enable a wide set of financial transactions. The study shows that technology has been important in promoting the shift from traditional banking practices to digital financial services and that the increase in digital literacy has also enabled this transition. The results also show that mobile banking users gain several practical advantages which lead to increased mobile banking adoption rates. The most common benefit mentioned is the speed of transactions that can be done in seconds, that means that in just a few seconds, any user can make payments, transfer funds, enquire about their account, and other banking transactions. This is a major improvement on the amount of time spent at the bank branches and waiting in queues. In addition, users say that they have significant savings on travel costs, especially in rural areas where it could be difficult and expensive to go to a bank. Mobile banking also offers improved convenience, accessing financial services anytime and anywhere with connectivity to the network. This flexibility offers users the ability to conduct financial transactions as per their financial timelines, irrespective of their location. Also, the respondents say that mobile banking has made it easier for them to keep track of spending, make savings more efficient, stay better on top of transactions and make financial decisions more effectively. Improved financial management skills support improved financial decision making and increased formal financial system participation. In conclusion, the findings strongly corroborate the existing literature on the positive effect of mobile banking technologies on financial inclusion through access to financial services, use of financial services, and economic participation of a variety of population groups. The use of mobile banking is on the rise and has great potential to drive sustainable and inclusive financial development.

4.2. Financial Inclusion Performance Assessment

The mobile banking technologies have had a major impact on enhancing access to and use of financial services for users, as evidenced by the financial inclusion performance assessment. Key performance indicators were used to evaluate, measuring different aspects of financial inclusion: financial access, transaction efficiency, savings behaviour, digital payment adoption, customer satisfaction and financial participation. The findings show that mobile banking has significant positive impacts on every measure, confirming its potential for inclusive financial development and for economic empowerment in general.

Table 1: Financial Inclusion Performance Assessment

Indicator	Percentage (%)
Increased Financial Access	88%
Improved Transaction Efficiency	85%
Enhanced Savings Behavior	79%
Increased Digital Payments	91%
Higher Customer Satisfaction	83%
Greater Financial Participation	87%

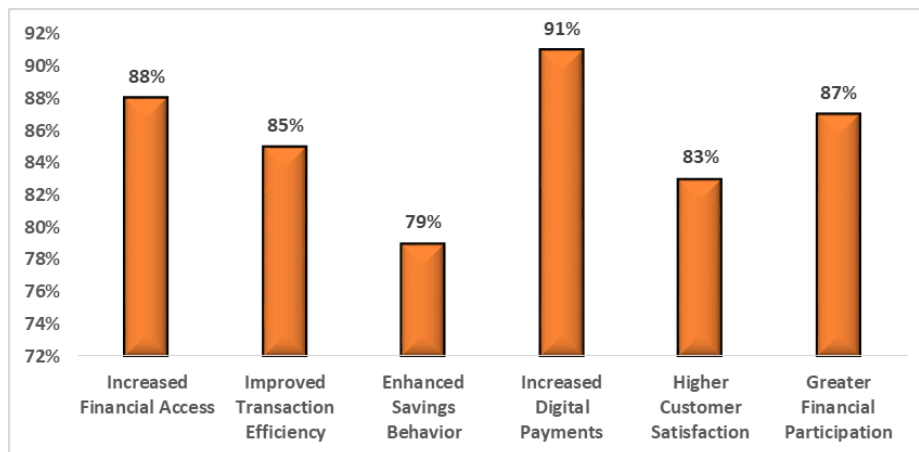


Fig 4 - Financial Inclusion Performance Assessment

4.2.1. Increased Financial Access (88%)

The assessment finds 88% of respondents benefiting from better access to finance using mobile banking technologies. The high percentage suggests that mobile banking has overcome the traditional constraints of physical banking infrastructure, geographical distance and availability of service. Users can easily access banking facilities using mobile devices and can open bank accounts, inquire fund balance, transfer money, and access other financial products without heading to the bank branch. The results indicate that mobile banking has been a key enabler to improve financial inclusion for previously unbanked and underserved groups.

4.2.2. Improved Transaction Efficiency (85%)

Around 85% of the respondents cited better transaction efficiency as a benefit of implementing mobile banking services. Mobile banking platforms enable users to perform financial transactions quickly and easily, allowing them to complete transactions much faster than traditional banking methods. It takes minutes for users to make payment, make fund transfers and carry out account related activities, instead of the days it would take for them to go to a branch to complete these tasks and have to deal with lengthy paperwork. Better transaction efficiency will make financial transactions easier for users and foster trust in digital financial systems, leading to greater adoption of formal financial services.

4.2.3. Enhanced Savings Behavior (79%)

The findings showed that 79% of users had positive changes in their saving patterns due to mobile banking. Mobile banking apps offer handy savings features, auto-saving options, account tracking and instant notifications on transactions, which helps users to better manage their finances. Easy access to digital savings tools encourages people to save regularly and helps them to plan for the long-term. The results suggest that mobile banking can indeed help financial stability by inducing financial discipline among its users.

4.2.4. Increased Digital Payments (91%)

The indicator which performed best was increased digital payments, with 91% of the respondents reporting higher use of electronic payment systems. Mobile banking allows people to make all kinds of cashless payments, such as shopping, paying utilities, recharging their mobiles, subscribing to services or transferring money to other persons. Digital payments are becoming more popular as people are moving toward more trusted e-financial services and towards a more digitalized economy. The high percentage reflects the great success of mobile banking in the field of cashless banking and efficient financial transactions.

4.2.5. Higher Customer Satisfaction (83%)

According to the assessment, 83% of respondents stated they were more satisfied with mobile banking services. Other factors that affect satisfaction include convenience of the service, accessibility, speed of transactions, security, and user experience. By enabling customers to access financial services anytime and anywhere, mobile banking helps to minimize inconvenience and enhance service quality. The positive satisfaction levels indicate that mobile banking is seen as an effective channel for delivering banking services and fulfilling banking needs by users.

4.2.6. Greater Financial Participation (87%)

The results show an increase in financial participation for 87% of the participants once mobile banking technologies were introduced. Financial participation also involves being active in activities like saving, borrowing, and investing, making payments, and using other financial products and services. Mobile banking makes these services easier to access, and helps users to be more active in the formal financial sector. Greater financial participation is a key factor in strengthening financial

inclusion and allows individuals and businesses to benefit from economic opportunities, enhance their financial security, and promote sustainable economic growth. This outcome in general emphasizes the significant role of mobile banking in enhancing the participation in the formal financial sector.

4.3. Discussion

Overall, mobile banking technologies are making an important contribution to achieve financial inclusion and ensure the inclusion of underserved populations in the formal financial system, as shown in the results of this study. The findings suggest that mobile banking has significantly facilitated access to financial services by bridging numerous gaps in traditional banking systems, such as geographic separation, inadequate banking network, and costly transactions. Mobile devices provide a convenient way for people to access financial services from anywhere, increasing financial inclusion and accessibility. This improved access will be especially beneficial for low-income and rural populations, who have struggled to access formal financial services, and for any individual who is seeking and needs financial services. The improved access will be especially useful for low-income and rural populations that have traditionally been less able to access formal financial services, and for anyone who is seeking and needs financial services. Consequently, mobile banking helps to enhance account ownership, financial service uptake and to promote financial sector inclusion. The study also shows how mobile banking's affordability and convenience has a significant impact on users' adoption and engagement. Mobile banking reduces the cost of accessing financial services, because it saves on travel costs, limits paperwork and reduces frequent visits to physical bank branches. These advantages inspire users to make regular monetary exchange, handle their financial savings greater effectively, and use a wider range of monetary merchandise. Convenience also fosters regular engagement with digital financial services and facilitates greater financial activity and inclusion. The above figure indicates that mobile banking adoption positively correlates with financial participation, underscoring the role of digital technologies in shaping the digital financial landscape. One of the key takeaways from the study is the significance of security in building trust and adoption. User authentication protocols, data encryption technologies, biometric verification systems, and real-time transaction monitoring are some of the advanced security mechanisms that drastically minimize risks in digital financial services. These measures provide a greater level of confidence for users, safeguarding their financial information and ensuring secure transactions. Moreover, mobile banking is a factor of socio-economic development, as it helps mobilise savings, simplifies business operations, boosts entrepreneurship and opens up access to electronic commerce. The outcomes further enhance economic opportunities and financial wellness for users. Overall, the study validates mobile banking as an effective technological tool to overcome financial exclusion, improve financial accessibility and foster a more inclusive, efficient and sustainable financial system for socio-economic development in the long term.

5. CONCLUSION

Technologies of mobile banking offer a powerful approach for delivering and accessing financial services and have proven to be one of the most successful solutions to improve financial inclusion in developed and developing nations. The emergence of mobile communication networks,

the increasing proliferation of smartphones in use and the constant innovations based on digital financial technologies have helped financial institutions reach beyond the confines of traditional banking infrastructure. This means that people who have been previously denied financial services because of geographical, economic or social restrictions can have access to a variety of financial services using their mobile devices. This change has greatly improved the capacity of financial institutions to serve populations that have not been well served, such as the rural and remote population that has limited access to conventional banking services. The results of this research show that mobile banking technologies have a significant positive effect on a number of outcomes of financial inclusion. The analysis showed that there were considerable gains in terms of financial access, enabling users to be able to easily use banking products without having to go to a branch. The mobile banking has also improved the transaction efficiency by providing a fast, secure and cost effective financial transaction. In addition, the digital tools and features for savings have promoted good savings habits and personal finance management. Digital payment systems have become a common way of doing business and have helped to promote the use of cashless transactions, which are more convenient and cost-effective for the users. Higher financial participation, through increased access to financial products and services, has also contributed to higher levels of financial participation. Increased financial participation through access to financial products and services, has also helped to increase the level of financial participation, allowing small businesses and individuals to be more active in the formal financial sector. One of the key results of this study is that it has introduced a Financial Inclusion Index (FII), which is a structured and practical model for measuring the performance of financial inclusion. The index combines accessibility, usage and service quality aspects and provides an overall assessment of the impact of mobile banking technologies on the financial inclusion target. It can be used as a useful tool for researchers, policy makers, financial institutions and regulators to evaluate the effectiveness of financial inclusion programs, pinpoint strengths and weaknesses and track progress over time. In the future, developments in mobile financial services, artificial intelligence, blockchain, digital identity and data-driven financial solutions will have increasingly significant impacts on financial inclusion. But the continued investment in digital infrastructure, cybersecurity, consumer protection and financial literacy will be needed for successful expansion of mobile banking. Inclusive and sustainable growth will depend on supportive regulatory environments and intergovernmental cooperation between telecommunications services, financial and fintech companies. Thus, mobile banking technologies are going to remain a major contributing factor to financial inclusion, economic empowerment, entrepreneurship and socioeconomic development. Overall, mobile banking is likely to play a vital role in global financial inclusion initiatives and in promoting sustainable economic development on a global scale.

REFERENCES

- [1] T. Oliveira, M. Faria, M. A. Thomas, and A. Popovič, "Extending the understanding of mobile banking adoption: When UTAUT meets TTF and ITM," *International Journal of Information Management*, vol. 34, no. 5, pp. 689-703, Oct. 2014.
- [2] Y. S. Alalwan, N. P. Rana, Y. K. Dwivedi, and R. Algharabat, "Social media in marketing: A review and analysis of the existing literature," *Telematics and Informatics*, vol. 34, no. 7, pp. 1177-1190, 2017.
- [3] M. Fishbein and I. Ajzen, *Predicting and Changing Behavior: The Reasoned Action Approach*. New York, NY, USA: Psychology Press, 2010.

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- [4] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319–340, 1989.
 - [5] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: Toward a unified view," *MIS Quarterly*, vol. 27, no. 3, pp. 425–478, 2003.
 - [6] M. Jack and T. Suri, "Mobile money: The economics of M-PESA," NBER Working Paper Series, No. 16721, National Bureau of Economic Research, Cambridge, MA, USA, 2011.
 - [7] T. Suri and W. Jack, "The long-run poverty and gender impacts of mobile money," *Science*, vol. 354, no. 6317, pp. 1288–1292, Dec. 2016.
 - [8] A. Demirgüç-Kunt, L. Klapper, D. Singer, and P. Van Oudheusden, *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. Washington, DC, USA: World Bank, 2018.
 - [9] C. Donner and T. Tellez, "Mobile banking and economic development: Linking adoption, impact, and use," *Asian Journal of Communication*, vol. 18, no. 4, pp. 318–332, 2008.
 - [10] N. Koenig-Lewis, A. Palmer, and A. Moll, "Predicting young consumers' take-up of mobile banking services," *International Journal of Bank Marketing*, vol. 28, no. 5, pp. 410–432, 2010.
 - [11] S. Laforet and X. Li, "Consumers' attitudes towards online and mobile banking in China," *International Journal of Bank Marketing*, vol. 23, no. 5, pp. 362–380, 2005.
 - [12] C. M. K. Cheah, S. Teo, and S. Sim, "Factors affecting Malaysian mobile banking adoption: An empirical analysis," *International Journal of Network and Mobile Technologies*, vol. 2, no. 3, pp. 149–160, 2011.
 - [13] R. P. Buckley and D. W. Malady, "Building consumer demand for digital financial services: The new regulatory frontier," *Journal of Financial Regulation and Compliance*, vol. 23, no. 3, pp. 230–244, 2015.