International Journal of Applied Science and Engineering
Citation: *IJASE*: **13**(01): 141-163, June 2025
DOI: 10.30954/2322-0465.1.2025.13

IJASE
INTERNATIONAL JOURNAL OF APPLIED SCIENCE AND ENGINEERING

CASE STUDY **MANAGEMENT SCIENCE**

The Impact of Fin-tech on Global Financial Inclusion: A Comparative Study

Durga Prasad Sahu[1]*, Jnana Raghavendra[2] and Santanu Kumar Das[3]

[1]*UGC-NET Qualified Research Scholar, School of Management Studies (SMS), GIET University, Gunupur, Odisha, India*
[2]*Associate Professor, School of Management Studies (SMS), GIET University, Gunupur, Odisha, India*
[3]*Dean (Academics), Gandhi Global Business Studies, Berhampur, Odisha, India*

**Corresponding author: durgaprasadsahu786@gmail.com*

Received: 20 Mar., 2025 **Revised:** 30 May, 2025 **Accepted:** 09 June, 2025

ABSTRACT

Financial inclusion, the equitable access to and usage of financial services by all members of society, remains a critical challenge worldwide. The advent of Fin-tech has emerged as a powerful tool in addressing this issue. This research paper explores the influence of Fin-tech on global financial inclusion. The study focuses on a comparative analysis between developed and developing countries, examining how digital payments have enhanced access to financial services. With financial data from key countries, such as India, Kenya, Sweden, Brazil and china. The paper analyzes both the successes and challenges of adopting these systems. By evaluating government policies, technological innovations, and socio-economic factors, the study provides insights into how digital payments have helped bridge the financial divide globally and what further measures can improve accessibility. The study explores the key drivers, challenges and opportunities associated with digital financial inclusion, focusing on the role of mobile money, e-wallets, and other innovative technologies and examine the role of Fin- tech in promoting global financial inclusion, comparing the impact across various regions and socio-economic contexts.

Key words: Fin-tech, Financial inclusion, financial services, Global financial inclusion, Digital payments, Mobile money.

The digital transformation in finance has reshaped global payment systems, resulting in unprecedented access to financial services. Fin-tech, ranging from mobile money to bank-backed digital payment networks, have increasingly become key drivers of financial inclusion, especially in under-served regions. In developing nations, where traditional banking infrastructure is sparse, mobile phones and digital wallets have emerged as vital tools for economic participation. The global financial ecosystem

How to cite this article: Sahu, D.P., Raghavendra, J. and Das, S.K. (2025). The Impact of Fin-tech on Global Financial Inclusion: A Comparative Study. *IJASE.*, **13**(01): 141-163.

Source of Support: None; **Conflict of Interest:** None

has seen a dramatic shift with the advent of digital payment systems. Traditionally, access to banking services was limited to those with access to physical banking infrastructures. However, digital payments have emerged as a transformative tool, enabling individuals to perform financial transactions remotely and securely. This development is especially significant in low-income and developing countries, where traditional banking systems are often inaccessible or insufficient.

Financial inclusion refers to the process of ensuring that all individuals and households have access to a range of financial services, including savings, credit, insurance, and payment systems, at an affordable cost. It aims to empower people to manage their financial resources effectively and participate fully in the economy. Financial inclusion is a cornerstone of economic development and social progress. It empowers individuals and businesses, fostering economic growth, reducing poverty, and promoting financial stability. However, billions of people worldwide remain excluded from formal financial systems, lacking access to basic financial services such as bank accounts, credit, and insurance. This financial exclusion perpetuates poverty, limits economic opportunities, and hinders overall development. In recent years, the rise of Fin-teach has revolutionized the financial landscape, offering innovative solutions to address the challenges of financial inclusion. Fin-tech, encompassing a range of technologies such as mobile money, e-wallets, and online banking platforms, have emerged as powerful tools in expanding access to financial services for the unbanked and under banked populations.

Research Problem

While Fin-tech have shown potential to improve financial inclusion, their impact varies across different regions. In some cases, digital payments have helped bridge the financial inclusion gap; in others, barriers such as digital literacy, infrastructure, and regulatory challenges persist. This research seeks to compare and contrast the impact of Fin-tech on financial inclusion across different global regions and explore the financial data that supports these findings.

Objectives of the Study

The study aims to:

1. Examine the role of Fin-tech in improving financial inclusion.
2. Provide a comparative analysis of the impact across developed and developing countries.
3. Assess financial data related to the usage and adoption of Fin-tech.
4. Identify barriers to adoption and propose recommendations for improving financial inclusion through digital payments.

LITERATURE REVIEW

Financial Inclusion and Its Importance

Financial inclusion refers to the ability of individuals to access and use appropriate financial products and services, including payments, savings, credit, and insurance. The World Bank defines financial inclusion as ensuring access to basic financial services for all individuals, particularly underserved populations such as low-income households, rural residents, and women. The importance of financial inclusion lies in its ability to improve socio-economic mobility, reduce poverty, and foster economic growth.

Fin-tech

Fin-tech include electronic methods for transferring funds, such as mobile money, online bank transfers, credit/debit cards, and crypto currencies. Mobile money platforms, such as M- Pesa in Kenya or Paytm in India, have been among the most successful in improving financial inclusion. These systems rely on mobile phones and internet-based platforms, allowing individuals to perform transactions, transfer money, and access financial services without requiring a physical bank account.

Global Trends in Fin-tech

A growing body of research highlights the expanding role of digital payments in facilitating financial inclusion. According to the World Bank, Fin-tech have the potential to reduce transaction costs, increase financial access, and offer a gateway for individuals to save and invest. In some countries, mobile wallets and contactless payments have become mainstream, while others are still grappling with low adoption rates due to factors such as poor digital infrastructure, lack of digital literacy, and regulatory constraints.

The Rise of Fin-tech

Fin-tech have revolutionized the financial landscape, providing a means of transferring funds electronically through mobile money platforms, credit cards, online banking, and cryptocurrencies. These systems are particularly advantageous in regions with limited banking infrastructure. The rise of mobile wallets such as Paytm in India, M-Pesa in Kenya, and various e-payment solutions in Europe and North America has significantly increased access to financial services.

Financial Data on Digital Payments

Studies by the World Bank show that in countries like Kenya, mobile money usage has reached 70% of the adult population. For instance, M-Pesa alone reported over 50 million active users by 2020. Similarly, the adoption of UPI (Unified Payments Interface) in India saw a 130% year-on-year growth in 2023, with over 8 billion transactions processed in a single month. These figures highlight the transformative potential of digital payments in increasing financial inclusion.

METHODOLOGY

Research Design

This study uses a comparative analysis method to evaluate the impact of Fin-tech on financial inclusion. A mixed-methods approach is employed, combining qualitative case studies from selected countries and quantitative financial data on adoption and usage patterns.

Data Collection

Data is collected from secondary sources such as: Reports from the World Bank, IMF, and regional development organizations. Financial data from mobile money providers like M- Pesa, Paytm, UPI, and others. Case studies and government reports on financial inclusion policies. Interviews with stakeholders in the digital payment ecosystem, including regulators, financial institutions, and technology providers.

Data Analysis

Quantitative data will be analyzed using statistical methods, focusing on the growth in the number of digital payment transactions, adoption rates, and financial inclusion metrics. Qualitative analysis will explore the barriers, challenges, and social implications of digital payment adoption.

CASE STUDY ANALYSIS

A Case study of India

India has experienced a transformative journey in the realm of digital payments over the past decade. Driven by rapid technological advancements, widespread smart-phone adoption, and government initiatives like Digital India, the country has emerged as a global leader in digital financial inclusion. This report explores the evolution, impact, and future trajectory of digital payments in India.

The Evolution of Digital Payments

The digital payment landscape in India has been shaped by several key milestones:

1. **Introduction of NEFT and RTGS (2000s):** The advent of National Electronic Funds Transfer (NEFT) and Real Time Gross Settlement (RTGS) laid the groundwork for digital transactions in India.
2. **Launch of IMPS (2010):** The Immediate Payment Service (IMPS) introduced instant interbank transactions, marking a significant shift in user convenience.
3. **Unified Payments Interface (UPI) Revolution (2016):** UPI, introduced by the National Payments Corporation of India (NPCI), revolutionized payments by enabling seamless peer-to-peer and merchant transactions.
4. **Government Push for Digital Payments:** The demonetization drive in 2016 acted as a catalyst, pushing millions towards adopting digital payment methods.
5. **Rise of Digital Wallets:** Platforms like Paytm, PhonePe, and Google Pay became household names, offering cashless solutions for a wide range of services.

Key Policies

- **Financial Inclusion:** With programs like the Pradhan Mantri Jan Dhan Yojana (PMJDY), which gives the unbanked access to banking services, and Aadhaar, the biometric identity system that acts as a foundation for digital payments and identity verification, India has placed a significant emphasis on digital financial inclusion.
- **Regulation:** The Reserve Bank of India (RBI) has put in place rules that strike a balance between consumer protection and innovation. Fintech and digital payments are governed by the Payment and Settlement Systems Act, and fintech companies can test their products in a controlled setting using the RBI Sandbox.

- **Digital Payments Infrastructure:** Peer-to-peer and business-to-consumer transactions have been transformed by the government's support of the expansion of digital payment platforms like UPI (Unified Payments Interface).
- **Startup Ecosystem:** With tax breaks and capital availability, India supports fintech companies through programs like Startup India and Atmanirbhar Bharat.
- **Open Banking & APIs:** To promote data exchange and innovation while maintaining security, the government is putting policies in place and working toward open banking standards.

Key Statistics

Table 1: The following table shows the UPI Volumes, values, no. of users and smart phone users

Metric	2016	2021	2023
UPI Transactions (Volume)	93 million	22 billion	45 billion
UPI Transactions (Value)	₹ 1.65 trillion	₹ 41 trillion	₹ 60 trillion
Digital Wallet Users	150 million	350 million	500 million
Smartphone Penetration	292 million	760 million	850 million

Source: RBI, NPCI & Banks

Benefits of the Digital Payment Revolution

1. **Financial Inclusion:** Digital payments have brought millions of unbanked individuals into the formal financial system.
2. **Convenience and Speed:** Transactions can now be completed in seconds, enhancing user experience.
3. **Economic Transparency:** Digital payments reduce the circulation of black money and enhance tax compliance.
4. **Empowerment of Small Businesses:** Digital platforms provide small businesses with affordable payment solutions and increased market reach.
5. **Boost to E-commerce:** Digital payment methods have fueled the growth of India's thriving e-commerce sector.

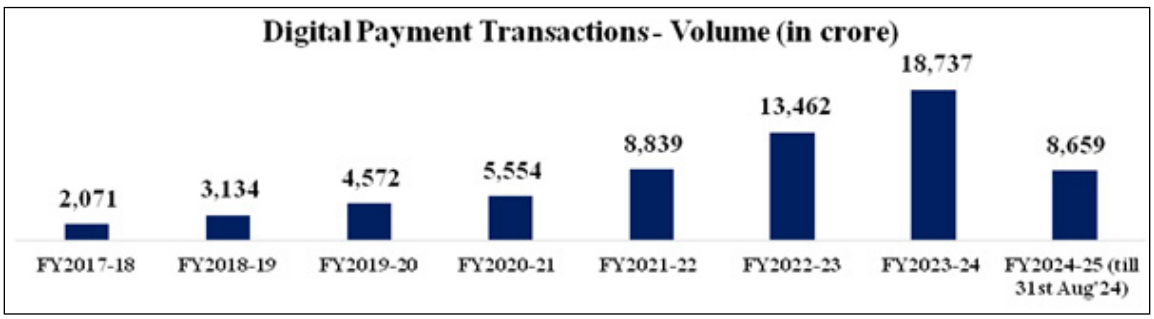
Future Trends

1. **AI and Machine Learning:** Advanced analytics will improve fraud detection and enhance user experience.
2. **Blockchain Technology:** Blockchain-based solutions could offer greater security and transparency in transactions.
3. **Voice-based Payments:** With increased adoption of voice assistants, voice-based payment systems are likely to gain traction.
4. **Cross-border Payments:** Simplified and cost-effective cross-border payment systems will further bolster India's position in global trade.

India has emerged as a global leader in Fin-tech, driven by government initiatives like Digital India and the widespread adoption of mobile wallets (e.g., Paytm, PhonePe). The country has witnessed a significant increase in financial inclusion, with millions of individuals in rural areas gaining access to digital financial services. However, challenges such as internet connectivity issues, digital literacy, and cyber security concerns persist. Financial Data: India's financial ecosystem has been heavily influenced by the introduction of the Digital India initiative and the UPI platform. In 2023, UPI processed over 8 billion transactions in a single month, an increase of 130% from 3 the previous year. Paytm, one of India's leading mobile payment platforms, reported over 300 million active users by 2023.

Growth in Digital Payment Transactions

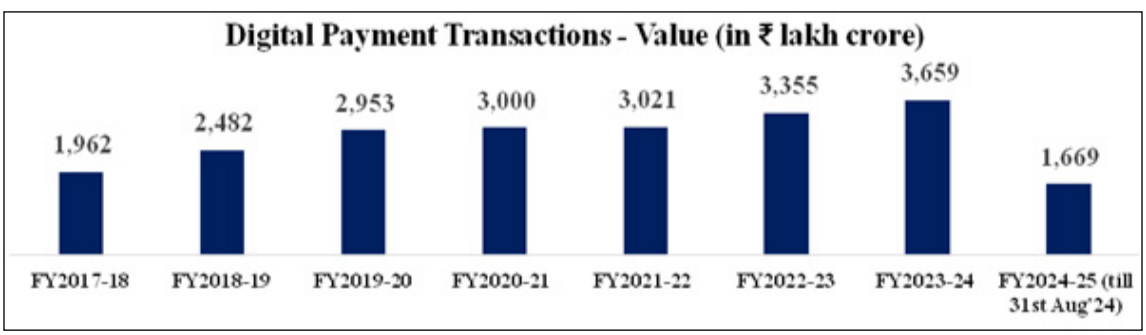
Digital payments in India have witnessed significant growth, with the total number of digital payment transactions volume increased from 2,071 crore in FY 2017-18 to 18,737 crore in FY2023-24 at Compounded Annual Growth Rate (CAGR) of 44%. Furthermore, during the last 5 months (April-August) of the current financial year 2024-25, the transaction volume has reached to 8,659 crore.



Source: RBI, NPCI & Banks

Diagram 1: Shows the Total Digital Transaction volumes In crore

The value of transactions has grown from ₹ 1,962 lakh crore to ₹ 3,659 lakh crore at CAGR of 11%. Additionally, in the last 5 months (April-August) of the current financial year 2024-25, the total transaction value has surged to an impressive ₹ 1,669 lakh crore.

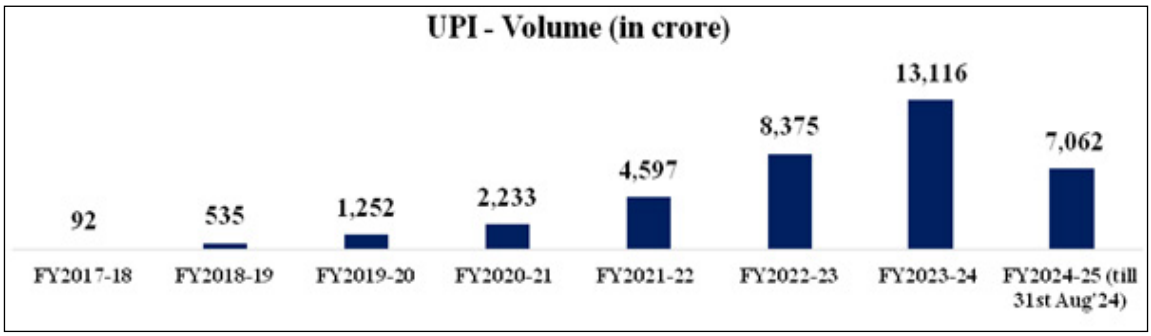


Source: RBI, NPCI & Banks

Diagram 2: Shows the Total Digital Transaction values In Lakh crore

UPI's Continued Success

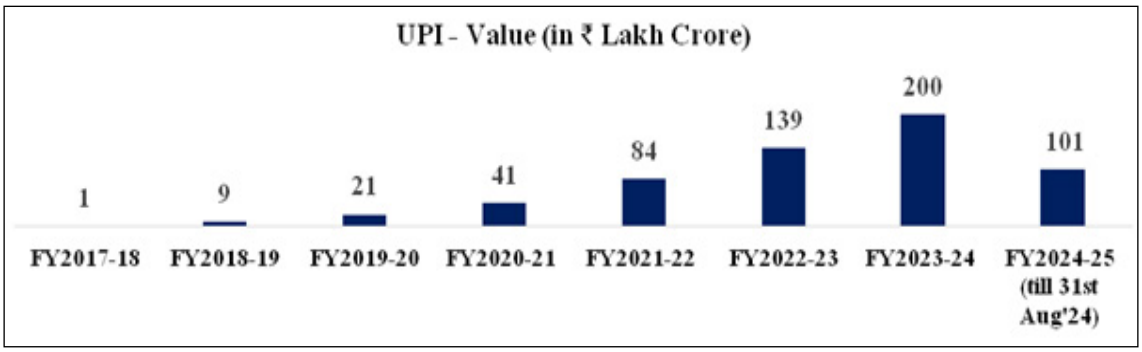
UPI remains the cornerstone of India's digital payment ecosystem. UPI has revolutionised digital payments in the country, UPI transactions have grown from 92 crore in FY 2017-18 to 13,116 crore in FY 2023-24 at CAGR of 129%. Furthermore, during the last 5 months (April-August) of the current Financial Year 2024-25, the transaction volume has reached 7,062 crore. The ease of use facilitated by growing network of participating banks and fintech platforms, has made UPI the most preferred mode of real-time payments for millions of users across the country.



Source: NPCI

Diagram 3: Shows the Total number of UPI Transaction volumes In crore

The value of UPI transactions has grown from ₹ 1 lakh crore to ₹ 200 lakh crore at CAGR of 138%. Additionally, in the last 5 months (April-August FY2024-25), the total transaction value has surged to an impressive ₹ 101 lakh crore.

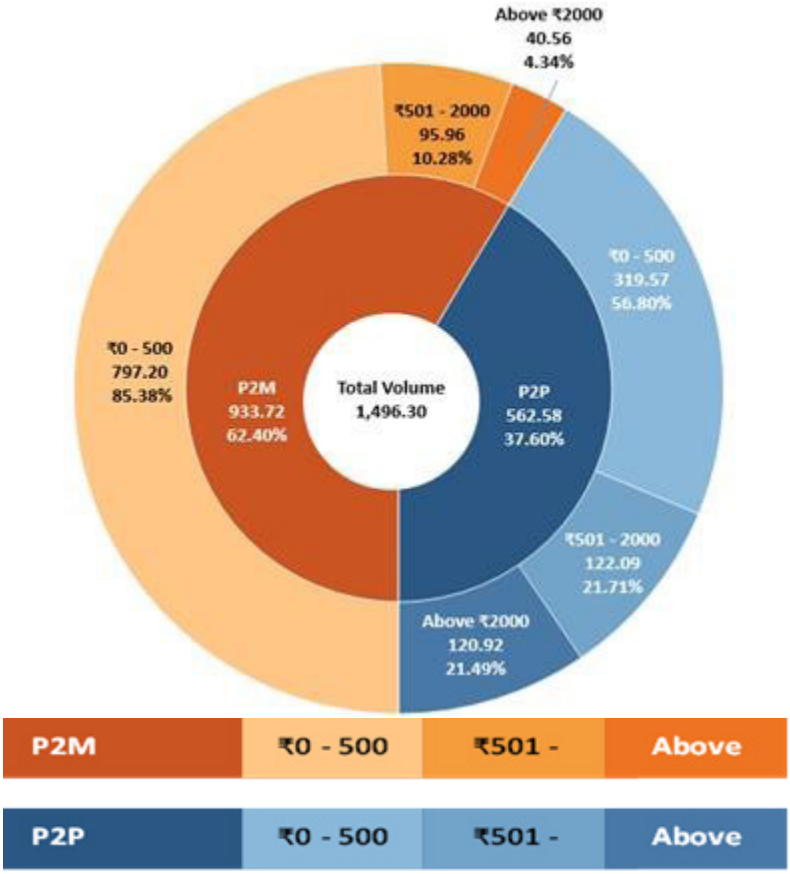


Source: NPCI

Diagram 4: Shows the Total number of UPI Transaction values In Lakh crore

UPI: P2M and P2P Transactions (by Volume in crore) for Aug 2024

The contribution of P2M transactions reached 62.40% in Aug' 2024, where 85% of these transactions are up to a value of ₹ 500. This indicates the trust that UPI enjoys among citizens for making low value payments.



Source: NPCI

Diagram 5: Shows UPI: P2M and P2P Transactions (by Volume in crore) for Aug 2024

UPI and RuPay Global Expansion

India's digital payments revolution is extending beyond its borders. Both UPI and RuPay are rapidly expanding globally, enabling seamless cross-border transactions for Indians living and traveling abroad. Presently, UPI is live in **7** countries, including key markets such as UAE, Singapore, Bhutan, Nepal, Sri Lanka, France, Mauritius, allowing Indian consumers and businesses to make and receive payments internationally. This expansion will further bolster remittance flows, improve financial inclusion, and elevate India's stature in the global financial landscape. As per ACI Worldwide Report 2024, in 2023 around 49% of the global real-time payment transactions is happening in India.

Challenges

1. **Cyber security Threats:** The rapid expansion of digital payments has also led to a rise in cybercrimes and frauds.

2. **Digital Literacy:** A significant portion of the population, particularly in rural areas, remains unaware of or unable to use digital payment platforms effectively.
3. **Infrastructure Gaps:** Network connectivity and the availability of smartphones remain challenges in certain regions.
4. **Regulatory and Operational Issues:** Ensuring a level playing field and addressing concerns like transaction fees remain areas of focus.
5. **Regulatory Uncertainty**: While the RBI has made strides in regulating fintech, there remain concerns about evolving rules, such as data privacy and cross-border transactions.
6. **Cybersecurity Risks**: With the rapid growth of fintech, ensuring the security of financial transactions and user data is an ongoing challenge.
7. **Access to Credit**: While digital payments have expanded, access to formal credit remains a hurdle, especially for small businesses and rural populations.

A Case study of Kenya

Kenya has emerged as a global leader in digital payments, driven by innovative technologies and widespread adoption of mobile financial services. This report explores the evolution, current state, and future prospects of Kenya's digital payment landscape. Kenya's digital payment ecosystem has been transformative, enabling financial inclusion and fostering economic growth. At the heart of this revolution is the success of mobile money platforms, such as M-Pesa, which have redefined financial transactions for individuals and businesses alike.

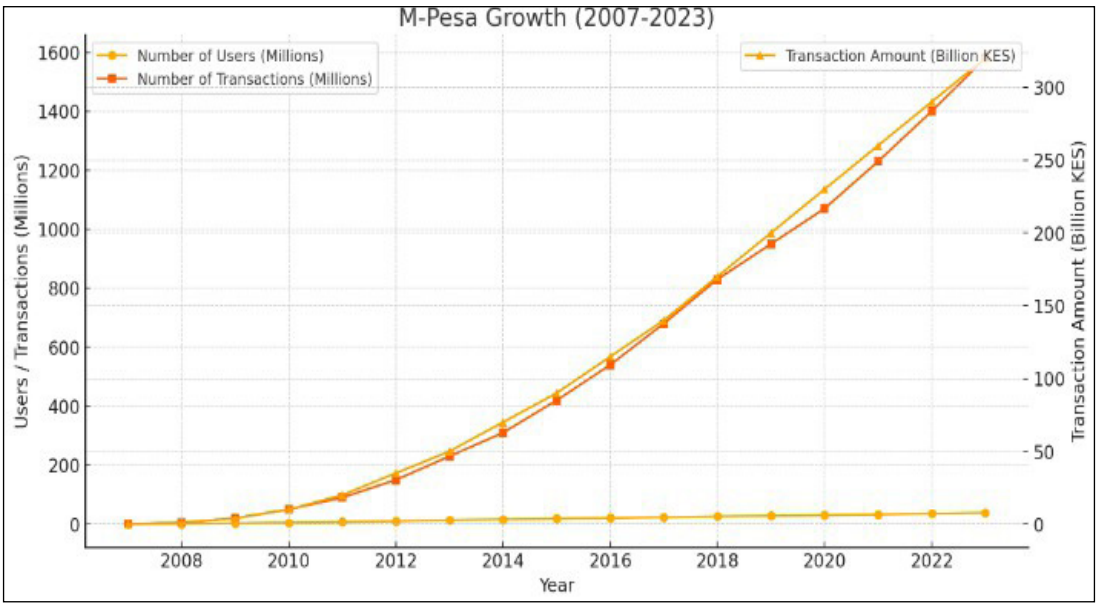
(a) The Evolution of Digital Payments in Kenya

- **2007: Launch of M-Pesa** M-Pesa, developed by Safaricom, revolutionized financial services in Kenya by providing a mobile-based platform for money transfers and payments.
- **2010s: Expansion of Mobile Money Services** Other players, such as Airtel Money and Equitel, entered the market, broadening the scope of digital payment solutions.
- **2020s: Integration with Banks and Global Payment Systems** Partnerships between mobile money providers and traditional banks, as well as international platforms like PayPal and Visa, have enhanced accessibility and functionality.

Key Policies:

- **Mobile Money and M-Pesa:** M-Pesa is spearheading the transformation of financial services, and Kenya has emerged as a global leader in mobile money. Infrastructure for mobile banking has benefited greatly from government funding.
- **Regulatory Environment:** To ensure the safety and transparency of mobile money systems, the Central Bank of Kenya (CBK) introduced the Kenya National Payments System (NPS) Act. Additionally, it created the Fintech Regulatory Sandbox to enable fintech companies to explore.

- **Financial Inclusion:** To reach unbanked people, particularly in rural areas, the government has concentrated on promoting financial inclusion through fintech.
- **Innovation and Digital Payments:** The Communications Authority of Kenya (CAK) and the CBK back programs that encourage the use of mobile money and digital payments.



Source: Safaricom Annual Report 2023

Diagram 6: Here is the figure shows the growth of m- Pesa's Growth from 2007 to 2023

(b) Current State of Digital Payments

Key Players

- **M-Pesa:** Dominates the market with over 30 million active users.
- **Airtel Money:** Offers competitive rates and cross-border transfer options.
- **T-Kash:** A service by Telkom Kenya targeting niche markets.

Metrics and Trends

- **Number of Transactions (2022):** 6.9 billion
- **Transaction Value (2022):** KES 7.9 trillion (~USD 62 billion)
- **Penetration Rate:** Over 80% of the adult population uses mobile money services.

Future Outlook

Integration with Emerging Technologies

- Adoption of block chain and crypto currency for secure and efficient payments.
- Use of artificial intelligence for fraud detection and personalized financial services.

Regional and Global Expansion

- Kenyan fintechs are expanding into neighboring countries, leveraging their expertise in digital payments.

Enhanced Interoperability

- Collaboration between mobile money providers and traditional financial institutions is expected to enhance seamless transactions.

Challenges

- **Digital Fraud:** The rise in cybercrime poses a threat to user confidence and financial security.
- **Infrastructure Gaps:** Limited access to reliable internet and electricity in some areas hampers the adoption of digital payments.
- **Regulatory Hurdles:** Balancing innovation with consumer protection remains a challenge for regulators.

Kenya's digital payment revolution is a testament to the power of innovation and adaptability. With continued investments in technology, infrastructure, and regulation, Kenya is poised to remain a leader in the global digital payment arena, setting an example for other nations to follow.

Kenya's M-Pesa platform is one of the most successful examples of mobile money driving financial inclusion. M-Pesa allows individuals to send and receive money, pay bills, and access loans via their mobile phones. The platform has transformed the financial landscape in Kenya, significantly reducing the unbanked population. However, the model's scalability in other regions with less robust mobile networks remains a concern. Financial Data: M-Pesa, Kenya's dominant mobile money service, reported 50 million active users as of 2020. According to the Central Bank of Kenya, 83% of adults in Kenya used mobile money for at least one financial transaction in 2020. M-Pesa alone handles billions of dollars in transactions each year. Impact on Financial Inclusion: Mobile money has provided financial access to Kenya's largely unbanked population. It enables users to transfer money, pay for goods and services, and even take out small loans using mobile phones.

A Case study of Sweden

Sweden has emerged as a global leader in the fintech and digital payment revolution. With a population

increasingly adopting innovative financial solutions, the country's cashless society is becoming a model for others to follow. This report explores the growth of digital payments, the role of key fintech players, and the impact of this transformation on consumers and businesses.

The Evolution of Digital Payments in Sweden

Historical Context

Sweden's journey toward a cashless economy began in earnest during the early 2000s. The government, financial institutions, and consumers collectively embraced electronic transactions, reducing the reliance on physical cash. By 2023, cash usage had declined to less than 10% of retail transactions.

Key Policies

- **Innovation and Regulation:** Sweden's regulatory framework is conducive to fintech. Fintech and other financial services are governed by the Swedish Financial Supervisory Authority (FI), which promotes innovation while protecting consumers.
- **Digital Payments and Financial Infrastructure:** With the extensive usage of digital payments and mobile wallets like Swish, which collaborates with banks, Sweden is one of the top countries in the transition to cashless societies.
- **Fintech Ecosystem:** With a robust startup culture, Sweden is home to prosperous fintech businesses like i Zettle, a mobile point-of-sale platform, and Klarna, a world leader in buy-now- pay-later services.
- **PSD2 and Open Banking:** Sweden has ratified PSD2, the Payment Services Directive 2 of the European Union, which encourages open banking and makes it possible for outside providers to obtain banking information, hence fostering fintech innovation.

Key Milestones

- **2013**: Launch of Swish, a mobile payment system enabling instant bank transfers.
- **2018**: Over 394 million transactions were conducted on Swish.
- **2023**: The adoption of digital payments reached an all-time high, with the majority of Swedes using fintech solutions daily.

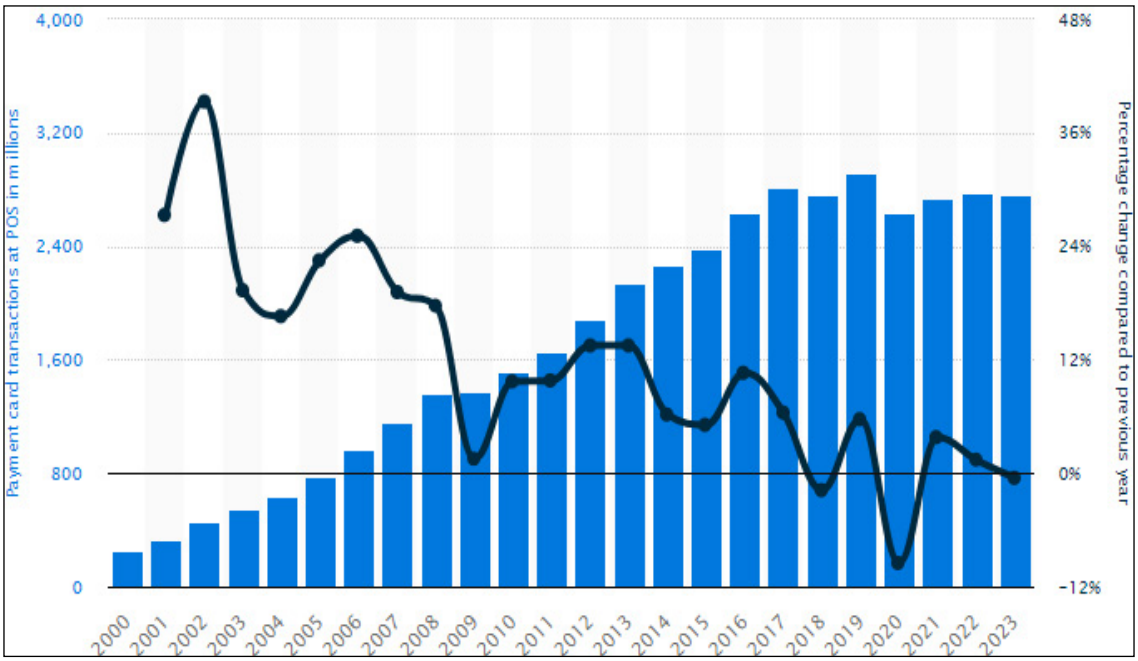
Major Players in the Fintech Ecosystem: Swish

Swish, introduced in 2012, is one of the most popular payment platforms in Sweden. Backed by major banks, it allows users to send and receive money in real-time using just a mobile number.

Adoption of Digital Payments

Fin tech Penetration: By 2023, 64% of Sweden's population actively used fin-tech services. The convenience, speed, and security of these solutions have driven their widespread acceptance.

Transaction Trends: The growth in transaction volume and value highlights the increasing trust and reliance on digital payment systems.



Source: Statista

Diagram 7: Here is the figure shows Card transactions in POS in Millions

Implications of the Digital Payment Revolution Benefits

- **For Consumers**: Convenience, security, and real-time processing.
- **For Businesses**: Reduced cash-handling costs, enhanced efficiency, and increased transaction volumes.
- **For Society**: Improved financial transparency and reduced crime associated with physical cash.

Sweden's digital payment revolution showcases the transformative power of fintech. Platforms like Swish and Klarna have redefined how transactions are conducted, benefiting consumers and businesses alike. As the nation continues to innovate, it sets a benchmark for other countries aiming to transition to a cashless society. However, addressing challenges like digital exclusion and cybersecurity will be critical to ensuring inclusive and secure financial services for all. Sweden is one of the most advanced countries in terms of digital payment adoption, with a strong reliance on credit and debit cards, mobile wallets, and contactless payments. The transition towards a cashless society has facilitated seamless financial transactions and promoted financial inclusion. However, Sweden also faces challenges related to the elderly population and those without access to digital devices. Financial Data: Sweden has seen a dramatic shift towards cashless payments, with cash transactions accounting for only 1% of payments in

2023. Digital payment adoption rates are close to 100%, with Swedes using cards and mobile payment apps like Swish for most transactions.

Challenges

- **Digital Exclusion**: Elderly and rural populations may face difficulties adapting to cashless systems.
- **Cyber security Risks**: The rise in digital transactions increases the need for robust security measures.

A Case study of Brazil

Brazil has emerged as a global leader in digital payment adoption, driven by innovation, a tech-savvy population, and supportive government policies. This report explores the key aspects of Brazil's digital payment landscape, focusing on its rapid growth, the role of major players, and its transformative impact on the economy.

Key Policies

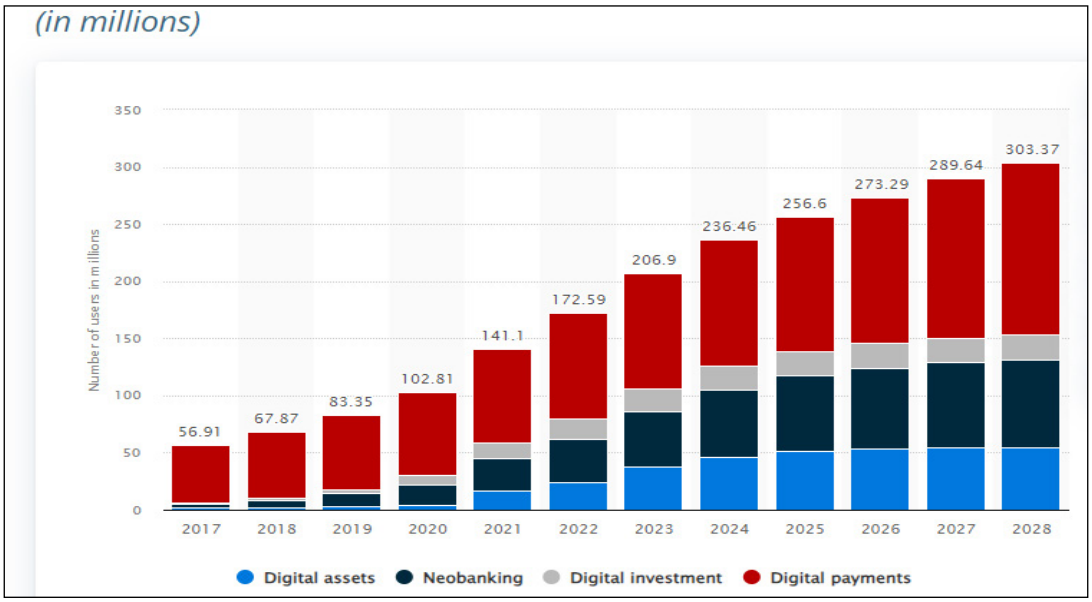
- **Initiatives from the Central Bank and Regulation:** The Central Bank of Brazil has put laws into place to control and encourage fintech innovation, such the Pix payment system, which is popular throughout the nation and enables instant payments.
- **Open Banking:** The European Union's PSD2 served as the model for Brazil's adoption of the open banking framework, which has prompted new fintech businesses to offer services by utilizing financial data.
- **Financial Inclusion:** The government backs programs that employ fintech to promote financial inclusion, especially for rural people that lack or have inadequate access to banking.
- **Innovation Support and Sandbox:** To encourage innovation and give fintech companies a controlled setting in which to test their ideas, the Brazilian Central Bank established a regulatory sandbox.

The Future of Digital Payments in Brazil

Brazil's digital payment revolution is far from over. With continuous innovation and government support, the country is poised to strengthen its position as a global leader in cashless transactions. Future trends to watch include the integration of crypto currencies, the growth of embedded finance, and the expansion of cross-border payment solutions.

Brazil's journey in the digital payment space is a testament to how technology and policy can work together to transform an economy. The adoption of systems like Pix, coupled with the rise of fintech innovation, has redefined the financial landscape, improving efficiency and inclusivity. While challenges persist, the opportunities are immense, signaling a bright future for Brazil's digital payment ecosystem. In Brazil, the government has spearheaded initiatives to provide digital payment solutions to its unbanked population,

such as the PIX instant payment system. PIX has been highly successful in promoting financial inclusion, particularly among low-income groups and small businesses. However, the system faces challenges in addressing fraud and ensuring data privacy.



Source: Statista

Diagram 8: Here is the figure shows Number of users in digital assets, Neobanking, Digital Investments And Digital payments

Financial Data: Brazil launched the PIX instant payment system in 2020. By 2023, PIX had reached over 60 million users, with a 300% increase in transactions from 2021 to 2023. The government estimates that PIX has brought over 40 million unbanked Brazilians into the financial system. Impact on Financial Inclusion: PIX has been highly successful in expanding access to digital payments, particularly for low-income households and small businesses. The system operates 24/7 and has significantly reduced transaction fees for users.

Overview of Brazil's Digital Payment Ecosystem

Brazil's digital payment ecosystem has expanded significantly over the past decade. The widespread use of smartphones and internet connectivity has enabled millions of Brazilians to adopt cashless transactions. Key drivers of this revolution include:

- **Pix:** Launched in 2020 by the Central Bank of Brazil, Pix has become the backbone of instant digital payments in the country, allowing real-time transfers 24/7.
- **Fintech Growth:** Companies like Nubank, Mercado Pago, and PagSeguro have revolutionized banking and payment services.
- **E-commerce Boom:** The rise of online shopping during the COVID-19 pandemic accelerated digital payment adoption.

Growth Metrics

Table 2: Shows the Number of digital payments , values of digital payments and number of active users in Brazil

Year	Number of Digital Payment Transactions (billion)	Transaction Value (BRL trillion)	Number of Active Users (million)
2020	5.4	3.2	130
2021	8.7	4.7	160
2022	12.4	6.3	200
2023	15.8	7.9	230

Source: Statista.

Key Players in the Market

- **Pix:** The government-backed instant payment system has achieved unprecedented adoption, with over 70% of the population using it regularly.
- **Nubank:** A leading digital bank in Latin America, Nubank has over 75 million customers and offers seamless digital payment options.
- **Mercado Pago:** The payment arm of Mercado Libre provides digital wallet services and is widely used for e-commerce transactions.
- **PagSeguro:** Known for enabling small businesses to accept digital payments, PagSeguro plays a vital role in financial inclusion.

Challenges

- Cyber security threats and fraud remain significant concerns.
- Digital literacy gaps limit adoption in certain demographics.
- Infrastructure in remote areas still needs improvement.

A Case study of China

China has emerged as a global leader in the digital payment ecosystem, with an unprecedented adoption of mobile payment solutions. The revolution in digital payments has been driven by a combination of technological advancements, government support, and consumer demand for convenience. Platforms like Alipay, WeChat Pay, and UnionPay have transformed the way Chinese citizens and businesses engage in transactions.

Overview of Digital Payments in China

1. Key Players in the Market

- **Alipay**: Operated by Ant Group, Alipay is one of the most widely used mobile payment platforms in China, offering services ranging from bill payments to wealth management.

- **WeChat Pay**: Integrated into the WeChat social media platform by Tencent, WeChat Pay allows seamless payments for goods, services, and peer-to-peer transactions.
- **UnionPay**: Known for its traditional card services, UnionPay has expanded into mobile payments, offering QR code and NFC-based solutions.

2. Adoption Rates

As of 2023, over 90% of urban Chinese consumers rely on mobile payment platforms for daily transactions. Rural areas are also rapidly catching up, thanks to government initiatives to bridge the digital divide.

Key Policies:

- **Fintech Regulation:** Payment platforms such as Alipay and WeChat Pay are subject to strict regulation by the People's Bank of China (PBOC) and other regulatory agencies. China has implemented measures to promote innovation and reduce financial risk in the fintech industry.
- **Digital Currency:** With the Digital Yuan, China is leading the way in central bank digital currencies (CBDC), which are intended to modernize payment systems and lessen dependency on conventional banks.yui8
- **Encouragement of Fintech Innovation:** The Chinese government encourages fintech by providing investment, infrastructure development, and startup-friendly legislation.
- **Blockchain and AI:** For fintech applications, the Chinese government has made significant investments in the development of blockchain technology and artificial intelligence.

Table 3: Shows the Number of digital payments , values of digital payments and number of active users in China

Year	Mobile Payment Users (millions)	Transaction Volume (CNY trillions)	Share of Cash Payments (%)
2019	711	151.0	23%
2021	903	231.8	15%
2023	1,017	325.0	10%

Source: People's Bank of China, i-Research Factors.

Driving the Revolution

1. Technological Advancements: The proliferation of smartphones and 5G technology has enabled seamless access to digital payment platforms.

2. Government Policies: The Chinese government has supported the growth of digital payments by promoting financial inclusion and reducing cash dependency. Initiatives like the Digital Yuan (e- CNY) exemplify state-led innovation in this sector.

3. Consumer Behavior: Chinese consumers value convenience, security, and speed. The integration of payment solutions into popular apps like WeChat and Taobao has fostered widespread adoption.

4. Merchant Integration: From street vendors to multinational corporations, businesses in China have embraced digital payments, creating a robust ecosystem that benefits both consumers and service providers.

Challenges

1. Digital Divide: Despite high adoption rates, rural and older populations face challenges in accessing and using digital payment systems.

2. Data Security and Privacy Concerns: The centralized nature of platforms raises concerns about data security and surveillance.

3. Regulatory Oversight: Increasing regulation by the Chinese government, including antitrust measures, has created uncertainties for private players like Alipay and WeChat Pay.

Future Trends

1. Expansion of the Digital Yuan: China's central bank digital currency (CBDC) is expected to further reduce cash usage and set a precedent for other nations.

2. AI and Block-chain Integration: Advanced technologies will enhance transaction security and offer innovative financial services.

3. Cross-Border Payments: Initiatives to internationalize platforms like Alipay and WeChat Pay aim to facilitate global trade and tourism.

China's digital payment revolution has transformed its economy, society, and global standing. By leveraging technology, fostering innovation, and addressing challenges, the country continues to set benchmarks in digital financial ecosystems. As the rest of the world looks to replicate China's success, the lessons learned here will undoubtedly shape the future of global finance.

Alipay and **WeChat Pay** are two of the largest mobile payment platforms in China, and they play a crucial role in the country's digital economy. Both have revolutionized the way people make payments, from everyday consumer purchases to larger transactions, by enabling easy, fast, and secure mobile payments.

COMPARATIVE ANALYSIS

Regional Differences in Adoption and Impact

Developed Countries: In Sweden and China, digital payments have been seamlessly integrated into the economy, and the high adoption rates indicate that financial inclusion has already been largely achieved. However, the shift towards a cashless society has left some vulnerable populations, such as the elderly, excluded from digital financial services. Developing Countries: In countries like India and Kenya, digital payments have led to a significant increase in financial inclusion, but challenges such as infrastructure, digital literacy, and cyber security concerns remain. The lack of a fully developed digital ecosystem in some regions has also led to uneven adoption rates.

India and China lead in fin-tech adoption rates, each at 87%. India's UPI system showcases substantial transaction volumes and values, reflecting the country's rapid digital payment adoption. Kenya's mobile payment market is on a growth trajectory, with significant increases in user numbers and transaction

values projected by 2028. While specific data for Brazil is limited, the region's fintech sector is expanding, particularly in digital payments and banking.

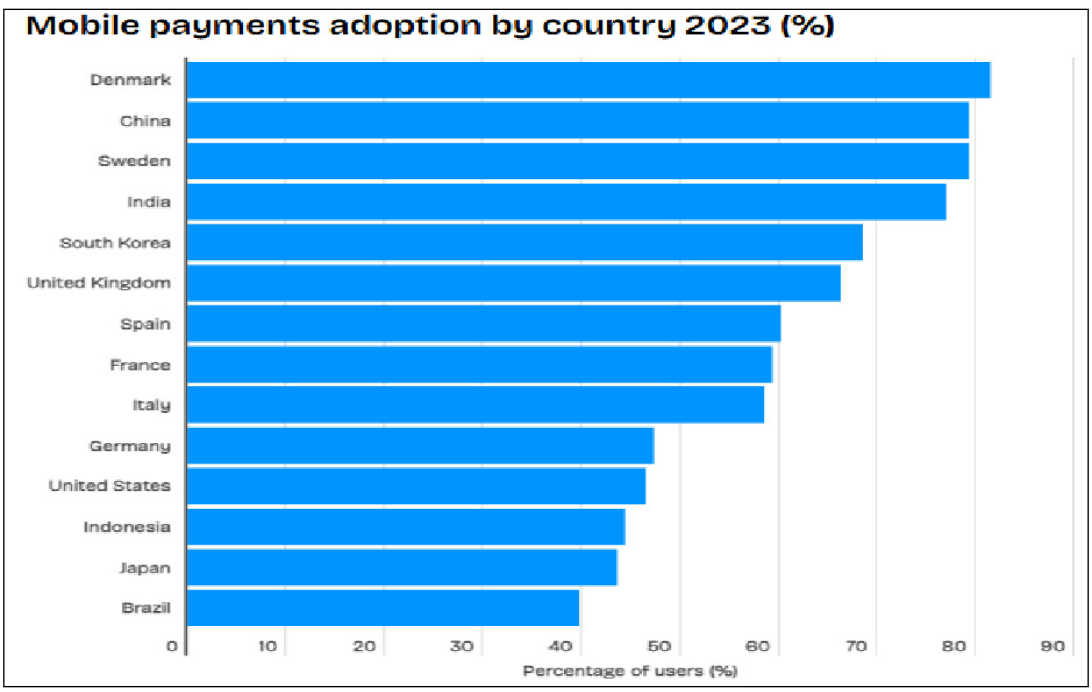
Comparative Insights

Government Support: While the amount and type of government support for fintech varies, all five nations—China, Brazil, Sweden, Kenya, and India—offer substantial assistance. Kenya concentrates on mobile financial inclusion, whereas China, Brazil, and India concentrate on infrastructural and regulatory frameworks. The Swedish government provides robust regulatory protections while promoting an innovative ecosystem.

Regulation: When it comes to fintech, China is more stringent than the other countries, especially when it comes to market control and cryptocurrencies. Kenya, Brazil, and India are more receptive to fintech innovation while maintaining the essential consumer safeguards.

Financial Inclusion: Fintech is a key component of financial inclusion in Brazil, Kenya, and India, particularly in terms of reaching unbanked people. China and Sweden prioritize updating their current systems.

Innovation and Digital Currency: While Sweden and India are concentrating on open banking and digital payment systems, China is setting the standard by introducing a central bank digital currency (the Digital Yuan). Every nation has developed fintech in a different way, striking a balance between innovation and regulation, cybersecurity and financial inclusion, and economic prospects and consumer safety.



Source: IMF,WORLD BANK

Diagram 9: Here is the figure shows Number of users in Mobile Adopations in Different Countries

Barriers to Widespread Adoption

Digital Literacy: A major barrier to adoption, particularly in rural or economically disadvantaged regions, is the lack of digital literacy. While mobile phones are widespread, users often lack the necessary skills to engage with Fin-tech fully.

Regulatory Issues: In some countries, outdated regulatory frameworks hinder the growth of digital payments. For instance, some countries have yet to introduce sufficient data protection laws or regulatory guidelines for mobile money platforms.

Infrastructure: Access to the internet, stable mobile networks, and smart-phones remains a challenge, especially in rural areas. These issues hinder the widespread adoption of Fin-tech.

DISCUSSION

Economic Impact and Poverty Reduction

Digital payments enhance economic participation by lowering transaction costs and providing faster, more efficient ways for businesses and individuals to access financial services. In developing economies, digital payments can be a tool for economic empowerment, allowing people to save, invest, and access credit that would otherwise be unavailable to them.

Social and Cultural Implications

Fin-tech help bridge the gender gap in financial access, with women in many countries being the primary beneficiaries of mobile money platforms. Furthermore, these systems empower marginalized communities by providing them with the tools to access financial resources and engage in economic activities.

Summary of Findings

Fin-tech has significantly contributed to global financial inclusion, particularly in developing countries. While digital payments have brought millions into the formal financial system, challenges such as infrastructure gaps, digital literacy, and regulatory issues must be addressed to ensure these systems benefit all segments of society.

Recommendations and Conclusion

Governments should invest in digital infrastructure and provide digital literacy training, especially in rural and marginalized areas. Policymakers should create regulatory frameworks that promote innovation while ensuring consumer protection and security. Financial institutions should collaborate with technology providers to develop accessible, user-friendly payment platforms.

Comparing the fintech landscapes of India, Kenya, Brazil, and China reveals significant variations in user adoption, transaction volumes, and transaction values.

1. India

- **Number of Users**: India's fin-tech adoption rate stands at 87%, with approximately 6,600 fin-tech startups operating between 2021 and 2022.

- **Transaction Volume and Value**: The Unified Payments Interface (UPI) has been a significant driver of digital transactions in India. In January 2024, UPI recorded 12.20 billion transactions, amounting to ₹ 18.41 trillion.

2. Kenya

- **Number of Users**: The number of users in Kenya's Mobile POS Payments market is expected to reach 13.05 million by 2028.
- **Transaction Volume and Value**: The transaction value in Kenya's Mobile POS Payments market is projected to reach US$5.46 billion in 2024, with an expected annual growth rate of 17.87%, leading to a projected total of US$10.54 billion by 2028.

3. Sweden

Sweden is known for its high adoption of digital payments, mobile banking, and fintech services. Estimates for the number of fintech users vary depending on the specific services being measured (mobile payments, digital wallets, lending platforms, investment apps, etc.).

- **Total Fintech Users:** Sweden has approximately 4 to 5 million active fintech users, representing a large portion of the adult population (around 70%–80% of adults). This includes users of digital payments, investing apps, mobile wallets (like Swish), and other fintech products.
- **E-commerce and Digital Payments:** Sweden has one of the highest e-commerce transaction volumes in Europe, driven by the use of fintech services.Total E-commerce Transaction Volume (2023): Approximately SEK 180 billion in Sweden, with a substantial portion of that being driven by fintech platforms like Klarna, Swish, and various mobile payment apps.

4. Brazil

- **Number of Users**: Specific user numbers are not available; however, digital payments and digital banking are the largest fintech subsectors in Latin America and the Caribbean in terms of users and transaction volumes.
- **Transaction Volume and Value**: Brazil's instant payment system, Pix, has seen significant adoption, with transaction sizes comparable to those in India and China.

5. China

- **Number of Users**: China shares an 87% fintech adoption rate with India, indicating a substantial user base.
- **Transaction Volume and Value**: China's digital payment platforms, such as Alipay and WeChat Pay, have facilitated a vast number of transactions, with transaction sizes significantly higher than those in India.

REFERENCES

1. Alaa Alaabed, F. and Mirakhor, A. 2017. *"Accelerating risk sharing finance via FinTech, NextGen Islamic finance"*, in The 1st International Colloquium on Islamic banking and Finance, pp. 1-10.

2. Arner, D.W., Barberis, J. and Buckley, R.P. 2015. "The evolution of FinTech: a new post-crisis paradigm", Geo. J. Int'l L, Vol. 47 No. 1, pp. 1-1271.

3. Baber, H. 2018. "How crisis-proof is Islamic finance? A comparative study of Islamic finance and conventional finance during and post financial crisis", *Qualitative Research in Financial Markets,* **10**(4): 415-426.

4. Baber, H. 2019. "Impact of FinTech on customer retention in Islamic banks of Malaysia", *International Journal of Business and Systems Research, forthcoming*.

5. Banerjee, A., Duflo, E., Glennerster, R. and Kinnan, C. 2015. "The miracle of microfinance? Evidence from a randomized evaluation", *American Economic Journal: Applied Economics,* **7**(1): 22-53.

6. Barr-Gill, O. and Warren, E. 2008. Making Credit Safer. Harvard Law School Program on Risk Regulation Research Paper No. 08-03, Harvard University, Cambridge, MA.

7. Bofondi, M. and Gobbi, G. 2017. "The big promise of FinTech", *European Economy,* **1**(2): 107-119.

8. Bruhn, M. and Love, I. 2014. "The real impact of improved access to finance: evidence from Mexico", *The Journal of Finance,* **69**(3): 1347-1376.

9. Demirgücô-Kunt, A., Klapper, L. and Randall, D. 2013a. Islamic Finance and Financial Inclusion: Measuring Use of and Demand for Formal Financial Services among Muslim Adults (Policy Research Working Paper No. 6642), The World Bank, Washington, DC.

10. Findex Database (Policy Research Working Paper No. 6025), The World Bank, Washington, DC. Hsu, H. and Lachenbruch, P.A. (2007), Paired t Test, Wiley encyclopedia of clinical trials, pp. 1-3.

11. Iqbal, Z. and Mirakhor, A. 2012. "Financial inclusion: Islamic finance perspective", *Journal of Islamic Business and Management,* **219**(1236): 1-62.

12. Islam, M.M., Ali, R.N., Salehin, M.M. and Islam, A.H.M.S. 2008. "Rural women and poverty: a study on the role of RDRS for poverty alleviation in Bangladesh", *Journal of the Bangladesh Agricultural University,* **6**(2): 415-421.

13. Karim, N. Tarazi, M. and Reille, X. 2008. "Islam microfinance: an emerging market niche", Focus Note 49, Washington, DC.

14. Karlan, D. and Zinman, J. 2009. "Expanding credit access: using randomized supply decisions to estimate the impacts", *Review of Financial Studies,* **23**(1): 433-464.

15. Siddik, M.N.A. 2017. "Does financial inclusion promote women empowerment? Evidence from Bangladesh", *Applied Economics and Finance,* **4**(4): 169-177.

16. Sinclair, S.P. 2001. Financial Exclusion: An Introductory Survey. CRSIS, Edinburgh College of Art/ Heriot Watt University, Edinburgh.

17. Ulya, N.U. 2018. "Peer to peer lending on financial technology under perspective positive law and Islamic law", *Journal of Islamic Business Law,* **2**(1).

18. Zins, A. and Weill, L. 2016. "The determinants of financial inclusion in Africa", *Review of Development Finance,* **6**(1): 46-57.

19. https://www.worldbank.org/ext/en/home

20. https://www.imf.org/en/Home

21. https://www.npci.org.in/

22. https://rbi.org.in/

23. https://www.centralbank.go.ke/

24. http://www.pbc.gov.cn/en/3688006/index.html

25. https://www.statista.com/

26. https://www.bcb.gov.br/en

27. https://www.riksbank.se/en-gb/