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From Electronic Banking to Modern FinTech: An Analysis of Trends, Infrastructures, and Innovations in the Financial Industry

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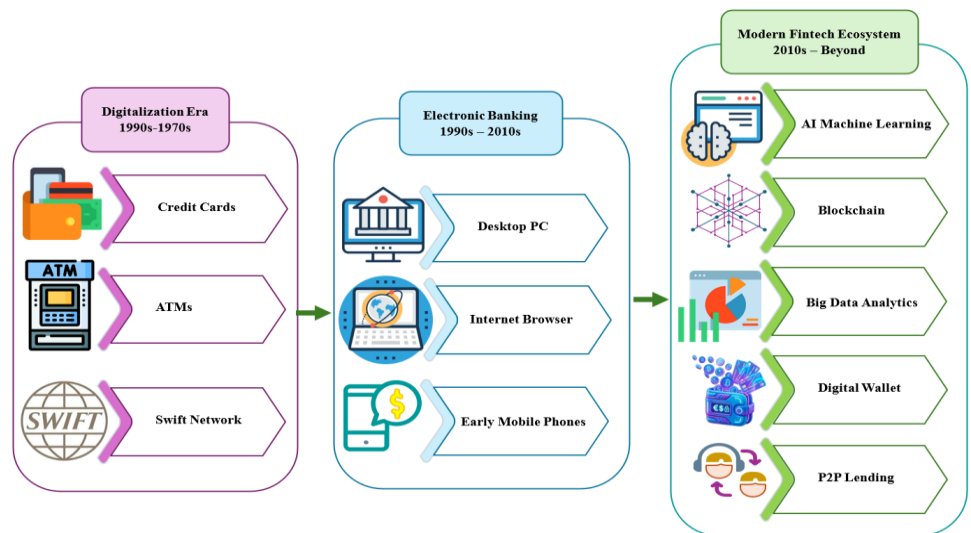
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ABSTRACT

Financial technologies (FinTech) have fundamentally transformed the structure of the banking and financial services industry over recent decades. This article aims to elucidate the major trajectories of transformation in the financial services industry and digital banking through a descriptive analytical research method and a documentary/library-based approach, drawing upon the secondary analysis of data as well as authoritative academic and institutional sources. It examines the evolution of FinTech and digital banking across three principal stages: the initial digitalization of financial services, the emergence of electronic banking, and the formation of modern FinTech. In the first stage, instruments such as credit cards, automated teller machines (ATMs), and the SWIFT network paved the way for the integration of technology into the financial system. In the second stage, the expansion of the Internet, personal computers, and mobile phones brought online and mobile banking into the mainstream of banking services. In the third stage, following the 2008 global financial crisis and alongside the maturation of technologies such as smartphones, big data, artificial intelligence, and blockchain, the FinTech startup ecosystem emerged, and new actors including digital banks, mobile wallets, and peer-to-peer lending platforms entered the market. The findings of this article indicate that FinTech is not merely a technological tool, but rather a new paradigm in the provision of financial services, one that emphasizes transparency, accessibility, and user experience.



1. Introduction

Over recent decades, digital transformation has fundamentally reshaped the structure and functioning of the financial industry (Afanaseva et al. 2023, Afanaseva et al. 2024). One of the most significant manifestations of this transformation has been the transition from electronic banking to modern FinTech a trajectory that has not only altered the delivery of financial services, but has also redefined customer expectations, business models, infrastructural requirements, and even the nature of competition in financial markets (Adegbite, 2025). Electronic banking initially emerged with the aim of facilitating customers' access to banking services through digital tools; however, with the advancement of technologies such as artificial intelligence, big data, cloud computing, blockchain, and open application programming interfaces (APIs), the conditions were created

for the emergence of a new generation of innovative financial services that are now recognized as FinTech (Anguelov et al., 2004).

Modern FinTech goes beyond the mere digitalization of traditional banking services. By relying on agility, personalization, scalability, and enhanced user experience, it has challenged conventional patterns within the financial industry (Pervukhin D., Neyrus S., 2025). This transformation has not only increased the speed, transparency, and efficiency of financial service delivery, but has also created new opportunities for financial inclusion, the development of smart payment instruments, digital investment, innovative lending, and wealth management. At the same time, this path has been accompanied by challenges

such as cybersecurity, data protection, regulation, public trust, and infrastructural integration (Abis & Limbu, 2025).

The present article aims to provide a comprehensive and systematic analysis of this phenomenon by examining the concepts, structures, infrastructures, and applications of FinTech in the financial industry. First, the concept of FinTech and its evolution from a technological idea into a growing industry are explained (Tang L., Pervukhin D.A., 2024). Subsequently, a classification of FinTech services and business models is presented in order to clarify how these technologies have transformed the value chain of traditional banking and rendered a substantial portion of financial processes more agile, cost-effective, and customer-centric. The principal objective of this article is to demonstrate that FinTech is not merely a technological tool, but rather a new paradigm in the provision of financial services a paradigm that has compelled traditional actors to rethink their operational models and has created a context for both competition and collaboration among banks, startups, technology companies, and even non-financial platforms. Accordingly, a precise understanding of FinTech mechanisms and an appreciation of their transformative implications for banking have become unavoidable necessities in the digital age. This article seeks to present, through an analytical and practical perspective, a clear and reliable account of modern financial technologies and to map the future trajectory of banking through the lens of FinTech a path in which innovation, data orientation, and customer experience play a fundamental role as key determinants of success.

1.1. Definition of FinTech

FinTech refers to a set of technology-based solutions, tools, and business models aimed at improving, facilitating, and innovating the delivery of financial services. From this perspective, FinTech is not merely the use of software or electronic equipment in banks; rather, it represents a combination of technology, user experience design, data analytics, and novel models of customer interaction. Between 2008 and 2024, the FinTech industry experienced a 4.8-fold increase in the number of firms, reaching more than 31,000 entities, and its market value is projected to reach USD 950 billion by 2030. By encompassing services such as payments, lending, wealth management, and blockchain, this sector has shifted the boundaries of traditional finance through innovation and the enhancement of customer experience (Ahmadian et al., 1402).

1.2. Digital Banking and Electronic Banking

Electronic banking initially referred to the use of electronic channels such as automated teller machines (ATMs), point-of-sale (POS) terminals, and internet portals for the provision of banking services. With the expansion of the Internet and smartphones, the concept of digital banking emerged, extending beyond a mere distribution channel to encompass the redesign of the bank's business model on the basis of digital technology (Anguelov et al., 2004).

1.3. Enabling Technologies in the Financial Industry

The modern financial industry increasingly relies on enabling technologies. Artificial intelligence, with its capacity to analyze vast volumes of data, enables service personalization, risk prediction, and the identification of complex patterns. Distributed ledger technology and blockchain have facilitated transparency, transaction security, and the execution of smart contracts, thereby transforming financial supply chains. Likewise, big data, through the collection and processing of diverse datasets, substantially contributes to a deeper understanding of customer behavior and to the development of innovative solutions. These technologies constitute the foundation of digital transformation and innovation in financial services (Pahlavani et al., 1404).

1.4. Open Banking and Platform Ecosystems

Open banking is an emerging approach in the financial industry based on the secure sharing of customers' financial data with their consent through application programming interfaces (APIs). Under this approach, banks no longer act solely as direct service providers; rather, they assume the role of facilitators within a broader financial ecosystem. In such a model, platform ecosystems are formed in which FinTech firms and other service providers can connect to banks' APIs to design and deliver integrated and innovative products and services for end users. This synergy among diverse actors leads to increased market competition, enhanced customer experience, and expanded access to financial services (Casolaro et al., 2025).

2. Methods

2.1. Research Design

This study employs a descriptive–analytical research design grounded in a documentary and library-based approach, relying on the secondary analysis of data. The main purpose is to explain the transformation trajectories of the financial services industry and digital banking and to conceptualize these developments within a staged framework consisting of initial digitalization, electronic banking, and modern FinTech. The analysis is based on published empirical and institutional evidence.

2.2. Data Sources

The study draws on secondary data obtained from authoritative academic and institutional sources. These sources include:

1. peer-reviewed journal articles and specialized scholarly books;
2. technical, analytical, and policy reports issued by financial institutions and regulatory bodies, including central banks, international organizations, and payment networks; and
3. official statistical databases and industry datasets.

To ensure the credibility and quality of the evidence, only sources satisfying the following criteria were included:

- The source had a clearly identifiable and verifiable publisher or issuing institution;
- The publication date and the temporal coverage of the data were explicitly reported; and
- The data could be cross-checked against at least one independent source.

Where statistical discrepancies were identified, priority was given to data originating from more official, transparent, or methodologically documented sources.

2.3. Data Collection and Organization

Data from each source were extracted and recorded in a structured matrix in order to facilitate consistency and comparability. The extraction framework included the following elements: year or time period, geographical scope, indicator definition, unit of measurement, observed value, and source reference. For analytical purposes, the indicators were organized into three major dimensions:

Dimension	Components / Indicators
Infrastructures and networks	Cards, ATMs, interbank messaging and settlement systems, digital channels
Enabling technologies and capabilities	Internet and mobile technologies, big data and artificial intelligence, blockchain and platforms
Market and actors	Growth in the number of FinTech firms, market size, network/currency shares, emergence of neobanks and platforms Review of indicator definitions and methodological differences across sources, such as coverage scope, base year, and estimation method, and incorporation of these considerations into the interpretation of resultsestimation method, and incorporation of these considerations into the interpretation of results
Data preprocessing	

2.4. Analytical Procedure

The analysis was conducted at two complementary levels:

First, a historical–evolutionary analysis was undertaken in order to position key events, technological innovations, and institutional developments within a chronological sequence. These developments were interpreted through the analytical logic of technology, infrastructure, and institution/market, allowing the mechanisms of transition between the successive stages of financial transformation to be identified.

Second, a descriptive and trend-based analysis of secondary data was performed. Quantitative indicators were examined with emphasis on temporal and regional comparisons, as well as on observable shifts such as growth rates and changes in market share whenever such calculations were feasible. The quantitative findings were then integrated with documentary evidence to provide a more robust interpretation through the convergence of evidence.

2.5. Validity, Reliability and Bias Control

Several measures were adopted to improve the rigor and robustness of the study. First, data triangulation was employed by drawing upon different categories of sources, including academic, institutional, and statistical or industry-based materials. Second, the consistency of indicator definitions across sources was carefully examined, and differences in coverage or methodology were explicitly considered in the interpretation of results. Third, all sources used in tables, figures, and analytical comparisons were fully documented in order to ensure transparency and reproducibility.

3. Results and Discussion

3.1. Analysis of Fintech Growth Trends Based on Statistical Data

The global population of fintech companies between 2008 and 2024 is illustrated in Figure 1.

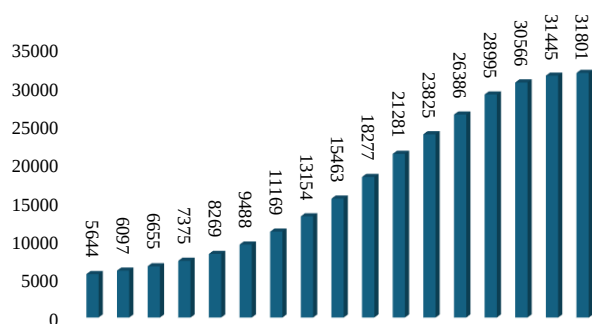


Figure 1. Number of Global FinTech Companies – in Billion USD (2008–2024)

Source: www.statista.com

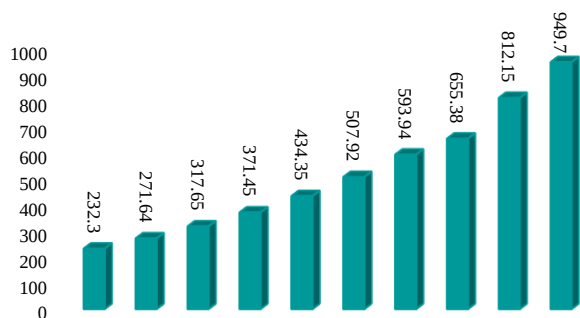


Figure 2. Global FinTech Market Size – in Billion USD (2021–2030)

Source: www.visionresearchreports.com

The global fintech market has experienced remarkable growth, rising from USD 232.3 billion in 2021 and projected to reach USD 949.7 billion by 2030, at a compound annual growth rate (CAGR) of 11.41%. This expansion is driven by the increasing adoption of financial innovations and growing demand for technology-based solutions. The principal domains of fintech include digital payments, money transfers, peer-to-peer lending, online investment, digital wealth management, digital insurance, cryptocurrencies, and blockchain. What unites these services is the application of technology to enhance efficiency, improve customer experience in the financial sector, and reshape its traditional boundaries (Mohammadi et al., 2024).

3.2. Historical Evolution of Fintech

3.2.1. First Stage: The Beginning of the Digitalization of Financial Services

The earliest phase of digital transformation in banking began in the 1950s, when initial technologies were introduced to improve efficiency and simplify banking operations. One of the most significant innovations of this period was:

- The emergence of credit cards: pioneers of electronic payment

The advent of credit cards enabled the general public to conduct non-cash transactions and is widely regarded as the starting point for the evolution of fintech.

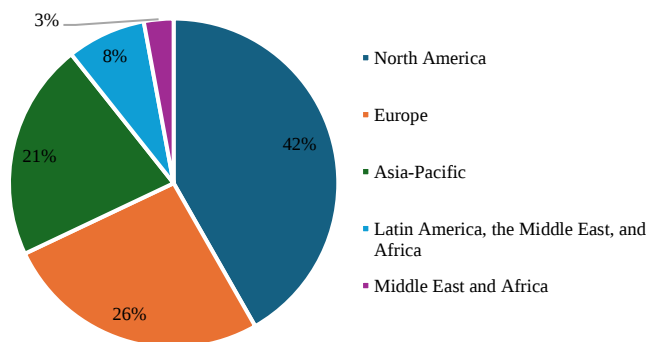


Figure 3. Global Credit Card Market Share by Payment Volume, by Region (2025)

Source: coinlaw.io

In 2025, the global credit card market is largely dominated by three regions: North America (43%), Europe (27%), and Asia-Pacific (22%). The ten largest issuers primarily U.S. banks offering Visa and Mastercard cards hold the predominant share of the market. By facilitating cashless purchases and

providing revolving lines of credit, credit cards have played a pivotal role in the evolution of electronic payment systems.

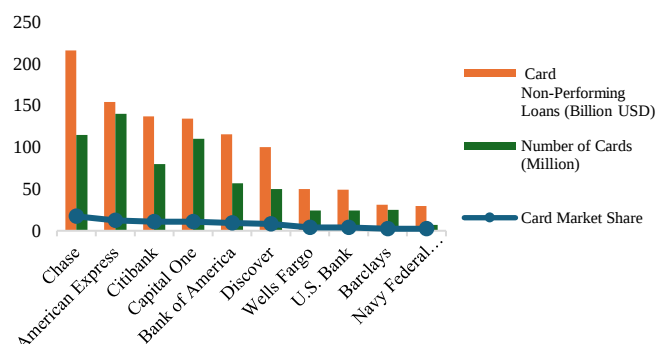


Figure 4. Market Share, Non-Performing Loans (NPLs), and Number of Cards of the Top 10 Foreign Banks

Source: www.cardrates.com

The U.S. credit card market is highly concentrated. In the first half of 2024, the five largest issuers accounted for 69% of total purchase volume, while the top 30 companies collectively covered nearly 90% of the market. Early successful credit cards rapidly gained popularity due to their greater convenience and security, and they played a significant role in the expansion of cashless payments and the development of the global credit card industry.

Table 2. Early Successful Credit Card Models

Card Name	Issuer	Country of Origin	Year of Launch	Application / Key Feature
Diners Club	Diners Club Company	United States	1950	The first general-purpose credit card; enabled cashless purchases with payment due at the end of the billing cycle.
BankAmericard	Bank of America	United States	1958	The first bank-issued credit card; later evolved into the Visa network.
American Express	American Express Company	United States	1958	Focused on business customers and travel services; expanded rapidly at the international level.
Master Charge (later Mastercard)	Consortium of U.S. banks	United States	1966	Established a broad credit card network; later renamed Mastercard.
Carte Bleue	Consortium of French banks	France	1967	The first national credit card in Europe; laid the foundation for European card networks.
Barclaycard	Barclays Bank	United Kingdom	1966	The first credit card in the United Kingdom; initiated card adoption in Europe.
Eurocard	Consortium of European banks	Sweden	1964	A regional European credit card; later merged with Mastercard.
JCB Card	Japan Credit Bureau	Japan	1961	The first credit card in Asia; later expanded into an international network.
Interbank Card	Interbank Group (U.S. banks)	United States	1966	The first card backed by an interbank network; became a major competitor to Visa in the global market.

Source: www.ubs.com, www.forbes.com, www.thalesgroup.com

Credit card networks are responsible for setting operating rules, authorizing transactions, and processing card payments. The credit card market in the United States is primarily dominated by four major players: Visa, Mastercard, American Express, and Discover. The key distinctions among these companies lie in their degree of global acceptance, the type of benefits offered to customers, and, ultimately, their respective market shares.

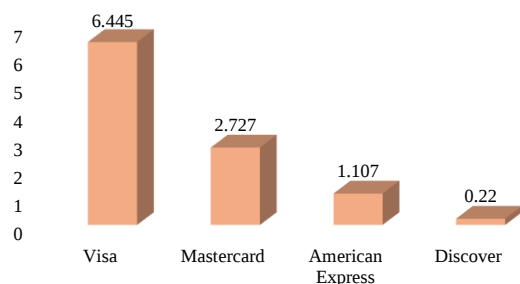


Figure 5. Leading Credit Card Networks in the United States in 2024, by Purchase Volume – in Trillion USD

Source: upgradedpoints.com

In 2023, Visa maintained its position as the preeminent credit card network, with its recorded purchase volume exceeding twice that of its nearest rival, Mastercard. This substantial disparity further solidifies Visa's market dominance.

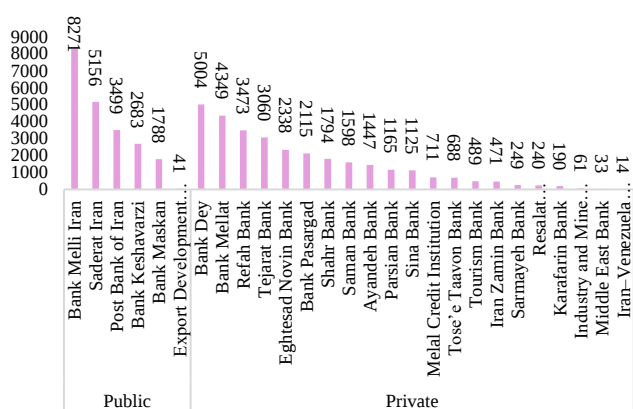


Figure 6. Number of Bank Cards Issued by Public and Private Banks (Khordad 1404 / June 2025)

Source: Central Bank of the Islamic Republic of Iran

As of June 2025, bank card issuance in Iran remains clearly dominated by state-owned banks. Bank Melli Iran, with approximately 64.8 million cards, ranks first by a considerable margin and has issued more cards than the combined total of many public and private banks. It is followed by Bank Saderat Iran, with 44.6 million cards, making it the second-largest issuer. The lowest level of issuance among state-owned banks belongs to the Export Development Bank of Iran, with approximately 20,000 cards. Among private banks, Bank Mellat leads with 33.9 million cards, followed by Tejarat Bank (23.1 million) and Refah Bank (19.3 million). The lowest card issuance among private banks is attributed to the Iran-Venezuela Bank.

- Global networking: facilitating international transactions

The SWIFT network was established in 1973 to replace traditional manual methods with a secure and standardized messaging system. By significantly enhancing the speed and accuracy of international transactions, this network became a core infrastructure of modern banking and a key enabler of the globalization of financial services.

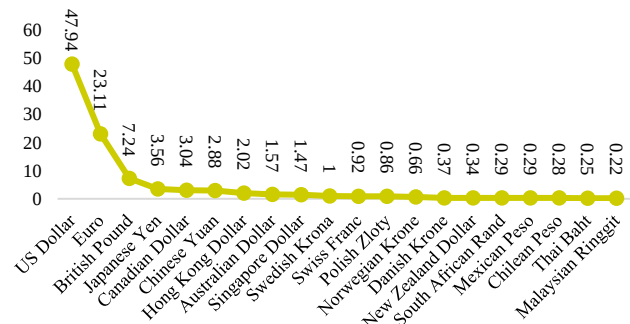


Figure 7. Share of Different Currencies in SWIFT Financial Transfers up to July 2025 (%)

Source: tradetreasurypayments.com

As of July 2025, the U.S. Dollar maintains the preeminent share of SWIFT transactions at approximately 47.94%, followed by the Euro at 23.11%. Other currencies, such as the British Pound, Japanese Yen, and Chinese Yuan, hold significantly smaller shares. Consequently, the global payment system remains primarily dominated by the Dollar and, to a lesser extent, the Euro.

- Revolutionizing Daily Services

In the 1970s, with the advent of Automated Teller Machines (ATMs) and electronic clearing systems, banking entered its nascent stage of digitalization. By streamlining services and increasing operational efficiency, these innovations transformed the customer experience and laid the groundwork for modern digital banking. Although seemingly basic by contemporary standards, they played a pivotal role in initiating the evolution of financial technologies.

- The Emergence of Automated Teller Machines (ATMs)

The first ATMs were introduced by Barclays Bank in 1967, providing round-the-clock access to banking services. While initially limited to cash withdrawals, these machines gradually incorporated additional functionalities, including balance inquiries, deposits, funds transfers, and bill payments. ATMs effectively eliminated the dependency on physical branch operating hours, playing a crucial role in establishing 24-hour banking and expanding customer accessibility (Central Bank of the I.R. of Iran).

As of June 2025, state-owned banks continue to dominate the country's ATM network, with Bank Melli Iran ranking first with more than 8,200 machines. In the private sector, Day Bank and Bank Mellat hold the largest shares; however, the strength of Bank Melli's network alone is equivalent to approximately one-third of the entire private banking ATM network.

- Electronic Clearing Systems

During the same decade, electronic clearing systems were also introduced. These systems constitute an electronic network for processing large volumes of financial transactions, such as payroll, bill payments, and interbank transfers. Electronic clearing systems replaced manual and paper-based procedures, such as checks, and significantly improved the efficiency of banking operations by reducing costs and accelerating settlement processes.

3.2.2. Second Stage: The Era of Electronic Banking

With the spread of personal computers and, subsequently, the Internet, banking shifted from face-to-face services to remote service delivery. In the 1980s, banks introduced the earliest form of electronic banking through simple home banking software. In the 1990s, with the widespread adoption of the Internet, internet banking enabled customers to view account information, transfer funds, and pay bills online. These developments are summarized in Table 3 (Dubey, 2025).

Table 3. Pioneering Electronic Banking Services and Their Transformative Impacts

Service	Description	Key Impact on Traditional Banking	Conceptual Significance in Digital Banking
Balance and statement inquiry	Customers gained access to their complete transaction history at any time.	Eliminated the need for in-person branch visits to obtain paper statements.	Self-service: Customers gained full control over their financial information.
Funds transfer	Enabled the movement of money between personal accounts or to other accounts without visiting a branch.	Reduced manual and time-consuming money transfer procedures within bank branches.	Remote transactions: Formed the foundation for all financial activities conducted via the Internet and mobile applications.
Electronic bill payment	Transformed the time-consuming and paper-based bill payment process into a simple and immediate procedure.	Significantly reduced the branch workload associated with routine payment processing.	Automation and integration: Represented an early example of integrating banking services with customers' everyday needs.

Sources: Dubey, 2019; Lee, 2025; Angratuvar et al., 2025.

During this period, the terms internet banking and online banking became key concepts in the financial industry, and pioneering institutions such as Wells Fargo and the Bank of Scotland were among the first official providers of these services in the mid-1990s.

- The Transition to Mobile Banking: The Beginning of the Mobile Era

In the late 1990s, banking entered a multichannel phase through the integration of branch services, ATMs, and websites. During this period, the use of SMS and wireless technologies marked the first steps toward mobile banking. Despite limitations such as low connection speeds and small screen sizes, these technologies enabled continuous and real-time access to account balances and transaction information. This stage reduced customers' dependence on physical

branches and personal computers, thereby creating the essential foundation for the emergence of advanced applications and today's digital transformation. In summary, the era of mobile banking transformed the customer experience by creating coordination across multiple service channels and establishing the necessary infrastructure for subsequent innovations. It served as a vital transitional stage that moved banking systems from traditional service models toward advanced digital banking and the mobile applications used today (Barnes & Corbitt, 2003; Weber & Darbellay, 2010; Al-Sofani et al., 2024; Kwatwane & Makhoul, 2025).

With the proliferation of personal computers and the Internet, remote banking emerged, enabling customers to perform online services such as balance inquiries, simple funds transfers, and bill payments. Subsequently, with the advancement of mobile technology, SMS, and later, smartphones, mobile banking became the primary service channel. Simultaneously, the entry of new market participants, such as PayPal, demonstrated that financial innovation was no longer restricted to traditional banking institutions.

- The Emergence of New Players: PayPal and the Transformation of Payments

The growth of e-commerce created a demand for simple, secure payment systems independent of traditional banks, leading to the establishment of companies like PayPal (1998). By enabling funds transfers via email, PayPal introduced two pivotal concepts to the financial industry, as detailed in Table 4.

Table 4. Two Key Concepts in the Payment Industry

Concept	Features	Application
Peer-to-Peer (P2P) Payments	Enables direct funds transfer between two individuals without traditional intermediaries (e.g., banks). The process is fast, simple, and often involves low or no transaction fees.	Personal Transfers: Splitting restaurant bills, sharing rent payments, or sending money to relatives.
	A service or platform that facilitates online payment processes for businesses and e-commerce stores. It securely collects customer card information and transmits it to banks for processing.	E-commerce Payments: Accepting online payments on websites and applications without requiring businesses to implement complex banking infrastructures.
Payment Intermediary (PSP)		

Source: Kim et al., 2024; Ghazi et al., 2025.

- Key Milestones of the Electronic Banking Era

The period from the 1980s to the early 2000s represented a transition from branch-centric banking to electronic and internet-based banking. During this era, services such as account monitoring, funds transfers, bill payments, and online shopping were established. The emergence of PayPal further solidified the foundations of the digital financial revolution.

Table 5. Key Milestones in the Evolution of Electronic and Internet Banking (1980s–Early 2000s)

Year/Period	Key Event	Main Actors	Key Feature / Outcome
Early 1980s	Deployment of banking software on personal computers	Selected banks in the United States and Europe	Enabled account viewing and payment instructions via floppy disks; the first step toward home banking.
Early 1990s	Expansion of internet banking	Banks such as Wells Fargo and the Bank of Scotland	Statement viewing, funds transfers, and bill payments via websites.
Mid-1990s	Emergence of online payment networks	VisaNet and the Mastercard network	Global infrastructure for online transactions; facilitated payments in e-commerce.
Late 1990s	Mobile banking	European and Asian banks	Balance notifications and transaction alerts via SMS. The first large-scale digital payment platform; a turning point for e-commerce and fintech.
1998	Establishment of PayPal	Confinity (later acquired by eBay)	Increased demand for secure online payments; strengthened the linkage between electronic banking and online shopping.
1999	Growth of online marketplaces (Amazon and eBay)	E-commerce giants	Enhanced transaction security; initiated the standardization of European banking networks for credit and debit cards.
Early 2000s	Evolution of smart cards	European banking networks	

Source: Daniele, 1999; Angoulev et al., 2004.

- Key Innovations in the Era of Electronic Banking

Innovations in the 1990s particularly smart cards, global payment networks, and the growth of online retail enhanced the security and speed of digital payments and transformed electronic banking into a global phenomenon. These developments subsequently laid the groundwork for fintech expansion in the decades that followed.

Table 6. Key Innovations in the Era of Electronic Banking

Innovation / Technology	Period of Emergence	Key Feature	Impact on Electronic Banking and Financial Services
Smart card systems	1990s	Storage of encrypted information on a card chip; enhanced transaction security	Reduced fraud and misuse in payments; established new security standards
Development of electronic payment networks	1990s	Expansion of global networks such as VisaNet and the Mastercard network	Provided infrastructure for online and international transactions; supported the growth of borderless payments
Early online retail platforms	Mid-1990s	Emergence of e-commerce (eBay and Amazon) and demand for secure, rapid payments	Increased demand for internet banking; accelerated innovation in payment systems

Source: Daniele, 1999; Angoulev et al., 2004.

Accordingly, the synergy of the three trends summarized in Table (6) transformed electronic banking from a limited innovation into a global and pervasive phenomenon, thereby providing the foundation for subsequent fintech developments in later decades

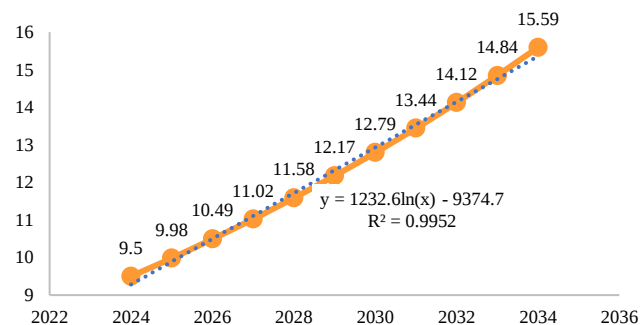


Figure 9. Global Electronic Banking Market Value – Trillion USD (2024–2034)

Source: www.precedenceresearch.com

Figure 30 shows that the global electronic banking market is projected to grow from USD 9.5 trillion in 2024 to approximately USD 15.59 trillion by 2034. This upward trend reflects the sustained expansion of digital financial services and the ongoing transformation of traditional banking worldwide.

Implications and Significance of the Electronic Banking Era

Electronic banking marked the beginning of the digital financial transformation and laid the foundation for the emergence of digital banking and fintech.

Table 7. Implications and Significance of the Electronic Banking Era

Dimension	Description	Key Implication for the Future of Digital Banking
Account management anytime and anywhere	Remote access to accounts, fund transfers, and bill payments without visiting bank branches	Initiation of the concept of “borderless banking” and the emergence of 24/7 financial services
Trust in digital channels	Gradual adoption of the internet and mobile technologies for financial transactions	Formation of a culture of remote banking and reduced dependence on physical branches
Internet payment infrastructures	Development of online payment networks and banks’ adaptation to e-commerce	Establishment of the foundation for fully digital banking and the expansion of online commerce
Entry of new players (e.g., PayPal)	Emergence of digital payment startups and innovative business models	Increased competition, accelerated innovation, and the formation of the early fintech ecosystem

Source: Research findings

3.2.3. Third Stage: Modern Fintech

The third stage is closely associated with the 2008 global financial crisis, an event that severely undermined public trust in traditional financial institutions. This erosion of confidence, combined with the rapid advancement of emerging technologies, created a favorable environment for fintech startups to enter the market with more transparent, agile, and user-centric business models (Arabi Moghaddam et al., 2025).

- The Impact of the 2008 Financial Crisis on the Emergence of Modern Fintech

The 2008 financial crisis not only diminished public trust in conventional banks but also subjected them to stringent regulatory frameworks. These conditions created space for the rise of fintech firms. Leveraging transparency, operational agility, and lower cost structures, these innovative startups simplified complex banking processes and positioned themselves as attractive, customer-oriented alternatives to large financial institutions (Dapp et al., 2015; Al-Saeed, 2023; Zhou et al., 2025).

- The Maturation of Enabling Technologies: The Infrastructure of the Revolution

Modern fintech emerged from the synergy of three foundational technologies: smartphones, big data and artificial intelligence, and blockchain. These technologies facilitated the expansion of mobile banking, intelligent data analytics, personalized financial services, secure transactions, and disintermediation. Collectively, they established the technological infrastructure necessary for sustained innovation in financial services (Walker et al., 2023; Tang et al., 2024; Kaid et al., 2025).

- The Emergence of New Market Participants: From Digital Banks to Mobile Wallets

New financial actors, by eliminating physical branches and digitizing core processes, have delivered banking, payment, and investment services that are more cost-efficient, faster, and broadly accessible. Through fully digital operating models, these entities have reshaped competitive dynamics within the financial sector and accelerated the transition toward platform-based financial ecosystems.

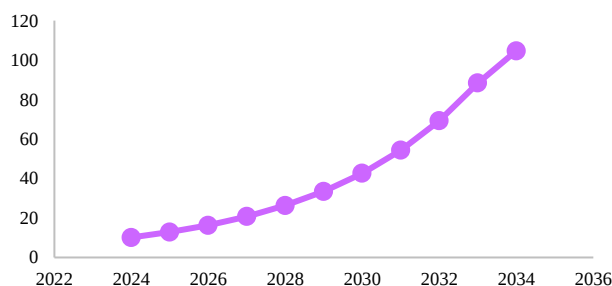


Figure 10. Global Digital Wallet Market Value – Billion USD (2024–2034)

Source: www.precedenceresearch.com

According to Precedence Research, the global digital wallet market is projected to grow from USD 14.10 billion in 2024 to USD 69.104 billion by 2034, representing more than a tenfold increase within a decade.

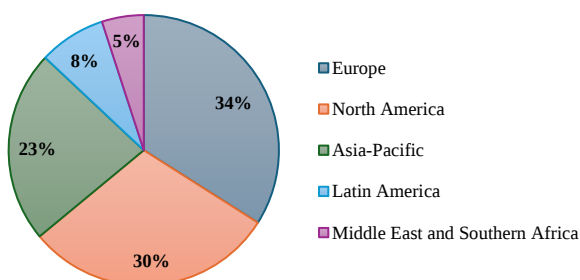


Figure 11. Digital Wallet Market Share by Region – Percentage (2024)

Source: www.precedenceresearch.com

In 2024, the global digital wallet market was largely dominated by Europe (34%), North America (30%), and the Asia-Pacific region (23%), which together accounted for approximately 87% of the total market share. The relatively small shares of the Middle East and Latin America indicate that the primary concentration of this technology remains in developed regions and major Asian economies.

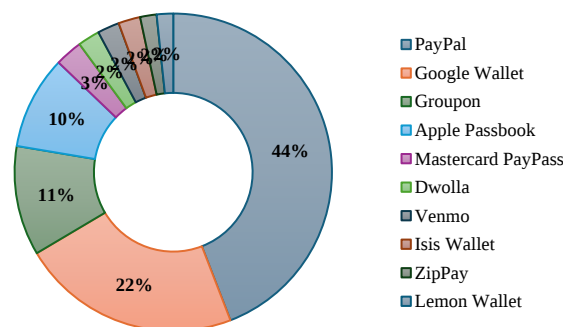


Figure 12. Most Widely Used Digital Wallets in the World – Percentage (2025)

Source: coinlaw.io

Figure 13 illustrates the pronounced market dominance of PayPal (79%) and Google Wallet (40%) in the digital wallet sector in 2025. The substantial concentration of market power in the hands of these two major players along with brands such as Groupon and Apple has left only a marginal share for smaller competitors.

- Emergence of the FinTech Startup Ecosystem Digital payments, peer-to-peer lending, digital wealth management, and insurtech collectively demonstrate that FinTech has evolved from being merely a “new delivery channel” into an autonomous and comprehensive financial services ecosystem.

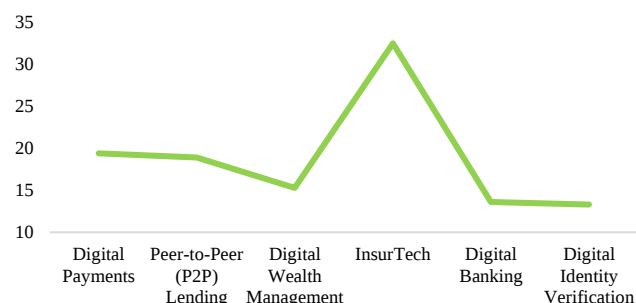


Figure 13. Fintech Revenue Growth Across Different Sectors (2024)

Source: bluetree.digital

3.2.4. Stage Four: The New Era of the Inclusive FinTech Ecosystem

Since 2015, FinTech has evolved from an emerging industry into an “inclusive ecosystem,” in which the boundaries between traditional banks and start-ups have become increasingly blurred. During this period, the dominant paradigm has shifted from a competition-oriented model to platform-based synergy (Cardoso, 2024).

Emergence of Neobanks: The Apex of Digital Banking Evolution Neobanks (fully digital, branchless banks) have redefined the digital-generation customer experience by eliminating overhead costs. Although these institutions (such as Revolut and Chime), due to their agile structures and service personalization capabilities, initially challenged the traditional banking model, they now function as “transformative partners” to incumbent banks (BS, 2023).

Table 8. Advantages and Challenges of Neobanks Compared to Traditional Banking

Analytical Dimension	Advantages (Opportunities)	Challenges (Limitations and Risks)	Conceptual Implications for the Banking Industry
Operational Model and Costs	Elimination of physical branches; significant reduction in operational costs; lean and scalable structure	Dependence on digital infrastructure and high investment requirements in cybersecurity	Fundamental transformation of banks’ cost structures and revenue models
Customer Experience	Simple, fast, and engaging user interfaces; personalized services; 24/7 support	Difficulty in gaining the trust of traditional customers; lack of human interaction in certain services	Emphasis on customer-centricity and digital experience design as the primary competitive advantage
Innovation and Speed of Development	Rapid deployment of new services through APIs and modular frameworks	Continuous innovation pressure and potential technological scalability failures	Acceleration of the innovation cycle in digital banking
Access and Financial Inclusion	Easier access for unbanked populations; more affordable and transparent services	Regulatory challenges and licensing restrictions in certain countries	Expansion of financial equity and global economic inclusion

Security and Trust	Use of biometric authentication and advanced encryption to enhance transaction security	Risks of cyberattacks, data breaches, and compliance challenges with data protection regulations	Necessity of balancing innovation, security, and regulatory compliance
Collaboration Model with Banks	Potential for collaboration and integration with traditional banks through open banking	Partial dependence on traditional banking infrastructure in early stages	Emergence of a coexistence model between neobanks and traditional banks within the modern financial ecosystem

Source: Barodawala, 2022; Suvjaneya, 2023; Mall et al., 2024; Raja, 2025

Neobanks such as Revolut, N26, Chime, and Monzo have demonstrated that branchless digital banking can be scalable, sustainable, and transformative.



Figure 14. Leading Active Neobanks in the World by Total Funding – Billion USD (2025)

Source: coinlaw.io

Figure 14 illustrates that in 2025, Chime and Revolut hold by a substantial margin the highest levels of capital among neobanks worldwide.

Open Banking: A Paradigm Shift from Ownership to Sharing

Open banking, by mandating data sharing through APIs, has transformed banks from “exclusive owners of financial services” into “facilitators of financial platforms.” It represents a structural shift from proprietary control over customer data toward a collaborative, ecosystem-based financial architecture.

Open banking creates its greatest value when technical standardization, transparent consent management, robust security and identity frameworks, and mature data governance are achieved simultaneously. In the absence of these conditions, risks related to user experience, cybersecurity, and regulatory compliance may diminish its competitive advantages (Zhi & Hu, 2024; Casolaro et al., 2025).

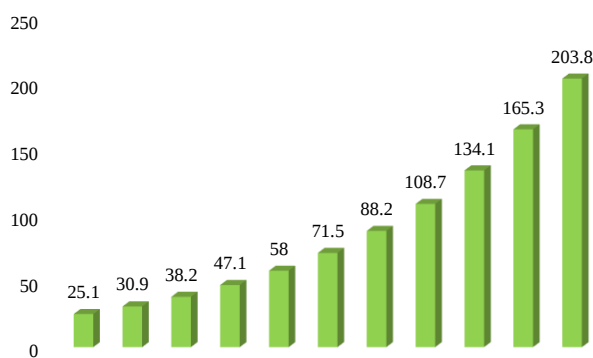


Figure 15. Global Open Banking Market Value – Billion USD (2023–2033)

Source: market.us

The market value of open banking is projected to grow eightfold, reaching approximately USD 204 billion by 2033. This transformation shifting banks from traditional institutions toward financial service platforms is being pursued through three primary approaches: regulatory mandates (as seen in Europe and the United Kingdom), cross-sector data rights frameworks (Australia), and market-driven models (such as those in Singapore and India). The choice among these pathways has a direct impact on the security and financial inclusion of these societies.

Globalization of the FinTech Ecosystem

FinTech has increasingly become a tool for financial inclusion in emerging economies, exemplified by platforms such as M-Pesa in Kenya and Paytm in India. By leveraging simple infrastructures (such as QR codes and SMS services) and super-app ecosystems, these platforms have connected underserved populations to the formal financial system. A common feature of these models is the integration of **everyday services** (e.g., transportation, bill payments) alongside financial services.

3.3. The Role of FinTech in Transforming Financial Services

3.3.1. Transformation of Business Models

With the evolving role of banks, emerging business models are built upon four key pillars:

4. Platformization: Integration of banking and non-banking services through API-based infrastructures.
5. Data-driven customer centricity: Personalization of financial products through artificial intelligence and advanced data analytics.
6. Disintermediation: Removal of traditional financial intermediaries through mechanisms such as peer-to-peer (P2P) lending.
7. Ecosystem collaboration: The emergence of the Banking-as-a-Service (BaaS) model, in which innovation is generated not solely within banks but through synergies across the broader FinTech ecosystem (Tarawneh et al., 2024; Abis, 2025).

3.3.2. FinTech in the Global Context and in Iran: From Borderless Innovation to Structural Constraints

FinTech firms have transformed the financial industry by eliminating intermediaries and digitizing intelligent services such as payments, lending, and wealth management, thereby significantly enhancing user experience. While the global financial landscape is moving toward open banking and frictionless innovation, FinTech development in Iran faces structural limitations. Strict regulatory frameworks, combined with the need to align new technologies with traditional financial infrastructures, create both regulatory challenges and opportunities for adaptive innovation.

3.3.3. The Role of FinTech in Transforming Banking Business Models

FinTech has reshaped the financial system across micro, meso, and macro levels. At the micro level, it has digitized and reduced the cost of customer experiences. At the meso level, it has redirected banks' revenue models toward platform-based collaborations. At the macro level, by enhancing financial inclusion and intensifying competition, it has transformed the role of banks from traditional intermediaries into infrastructure providers for innovative financial services (Pandey et al., 2024; Tang et al., 2024).

3.4. Cooperation and Competition Between Banks and FinTech Firms

The relationship between banks and FinTech firms has gradually shifted from confrontation and competition toward complementary collaboration. Within this framework, banks contribute trust, capital resources, and regulatory stability, while FinTech firms offer agility, innovation, and superior user experience, forming a strategic partnership.

Analysis of Opportunities and Challenges within the Ecosystem

- **Opportunities:** realization of open innovation, increased financial inclusion (particularly for **Generation Z** and populations in remote regions), diversification of services, and access to new platform-based markets.
- **Challenges:** cultural conflicts between traditional and agile organizational structures, regulatory complexities, data security risks, and the absence of common technical standards (such as standardized APIs) (Garad et al., 2025).

3.5. The Role of Financial Start-ups in the FinTech Ecosystem

Financial start-ups, through their agility and innovative capabilities, have transformed traditional banking services and emerged as a central driving force of FinTech development. By leveraging advanced technologies, these firms have significantly improved both the efficiency of financial services and the overall customer experience (Makiani & Kianpour, 2023).

Table9. Examples of Areas of Impact of Financial Start-ups

Area of Transformation	Role of Financial Start-ups	Impact on the Banking Industry
Digital Payments and Wallets	Development of mobile payments, payment facilitators, and payment APIs	Increased transaction speed, reduced fees, and decreased dependence on traditional payment terminals
Digital Lending	Use of alternative data for credit scoring; provision of online microloans	Improved access to credit for individuals without formal banking history
Digital Wealth Management	Creation of micro-investment platforms and algorithmic advisory services	Democratization of investment and reduction in the cost of financial advisory services
Digital Insurance	Design of personalized insurance policies based on data and behavioral analytics	Improved customer experience and reduced claim management costs
Open Banking and Data Services	Development of APIs and platforms that connect banking data to FinTech applications	Acceleration of innovation in banking products and increased healthy competition

Source: Bliank et al., 2025; Goel & Kashiramka, 2025

Financial start-ups, by transforming the role of banks from direct service providers into innovation platforms, have made financial services smarter, simpler, and more cost-efficient. However, their growth remains dependent on effectively leveraging digital opportunities while overcoming regulatory, financial, data-related, and security challenges.

Table 10. Opportunities and Challenges Facing Financial Start-ups

Opportunity / Challenge	Dimension	Description	Implications for the Banking Industry
Opportunity	E-government policies and open banking	Encouragement of banks to share data and collaborate with start-ups	Expansion of data-driven services and reduction of banking costs
Increased smartphone and high-speed internet penetration	Broad access to digital financial services even in underserved regions	Development of inclusive banking and greater financial equity	
Growth of capital markets and venture investment	Entry of venture capital funds and investment firms into the FinTech sector	Strengthening start-up financial capacity and accelerating ecosystem growth	
Banks' willingness to outsource innovation	Banks delegate part of their innovation and development processes to FinTech firms	Emergence of genuine co-existence and a shared financial ecosystem	
Increased public trust in digital services after COVID-19	Changes in customer behavior and preference for online channels	Faster adoption of financial technologies and increased FinTech penetration	
Challenge	Regulations and licensing	Traditional banking and insurance regulatory frameworks are often incompatible with FinTech models; absence of regulatory sandboxes limits innovation	Slower development, exit of innovators from the market, or complete dependence on banks
Access to data and banking APIs	Many banks still do not provide their data in open formats	Limitations in developing personalized services and account aggregation	
Financing and venture capital	Lack of specialized FinTech funds and active VC ecosystems in some countries	Weak scalability and reduced survival rates during growth stages	
Security and customer trust	High sensitivity of financial data requiring strong encryption and authentication mechanisms	Brand reputation risks and legal liabilities in the event of security breaches	
Collaboration with banks	Cultural conflicts between bureaucratic banking structures and the agile approach of start-ups	Delays in project implementation and failure to achieve effective synergy	

Source: Research Findings

4. Conclusions

The findings of this study indicate that over the past two decades, FinTech has evolved from a limited innovation in payments and electronic banking into a comprehensive, data-driven, and platform-based ecosystem.

Key Findings Dimension	Summary of Findings	Strategic Implication
Quantitative Growth	A 4.8-fold increase in the number of FinTech firms (2008–2024) and a projected market value of USD 950 billion by 2030.	FinTech has shifted from a peripheral phenomenon to a core pillar of the global economy.
Evolutionary Path	Transition from early digitalization stages (ATM/SWIFT) to the era of open ecosystems and neobanks.	FinTech transformation represents a gradual and cumulative process driven by successive technological innovations.
Key Drivers	The 2008 financial crisis (environmental driver) combined with artificial intelligence and blockchain (technological drivers).	Declining trust in traditional banks became a catalyst for financial innovation.
Service Diversification	Expansion beyond the monopoly of payments into lending, insurance, and wealth management.	FinTech has evolved into a comprehensive and multi-sector financial ecosystem.
Institutional Relationship	Paradigm shift from “zero-sum competition” to “complementary collaboration and open banking.”	The future of finance depends on integrating the agility of start-ups with the credibility and stability of banks.
Situation in Iran	Dominance of traditional banking infrastructures alongside regulatory constraints and limited API transparency.	Iran is in a transitional stage, and sustainable growth depends largely on regulatory reforms.
Social Function	Expansion of financial inclusion, particularly in developing economies.	FinTech functions as a mechanism for economic equity and the reduction of financial inequality.

Source: Research Findings

This study shows that the emergence of neobanks represents the peak of this transformation. By eliminating physical branches and designing fast, simple, and highly personalized digital experiences, neobanks have succeeded in attracting millions of users. Examples such as Revolut (15 million users) and Chime (12 million users) in 2025 demonstrate that banking services can operate with minimal physical infrastructure and rely primarily on data, APIs, and mobile platforms. Their significant cost advantages, innovative customer experience design, and rapid service development cycles have positioned neobanks as key players in the next generation of banking.

At the same time, digital wallets such as PayPal, Alipay, and GCash have strengthened the foundations of e-commerce and the digital economy by removing friction from payment processes. Forecasts indicate that the global digital wallet market will grow from USD 10.14 billion in 2024 to more than USD 104.69 billion by 2034, representing more than a tenfold increase and confirming the global shift toward a cashless economy.

However, the transformation of the financial sector has not been driven solely by competition; it has increasingly moved toward ecosystem-based collaboration and synergy. Open banking, as a new model of interaction between banks and FinTech firms, has enabled banking data and services to move beyond institutional monopolies through the use of application programming interfaces (APIs) and become a shared platform for innovation. The global open banking market is projected to grow from USD 25.1 billion in 2018 to USD 203.8 billion by 2033, an eightfold increase that reflects the evolving role of banks from “service owners” to “financial service platforms.” Within this model, banks no longer function solely as service providers but rather as infrastructures upon which others build innovative financial services.

This transformation has also had a profound impact on emerging economies. Countries such as India, the Philippines, Kenya, and Bangladesh have expanded financial inclusion for millions of people through simple yet scalable solutions such as USSD services, QR codes, agent networks, and super-app ecosystems. India, with a 90.8% digital wallet adoption rate in 2025, holds the

highest adoption rate globally and represents a successful case of integrating technology and public policy to achieve financial inclusion.

Ultimately, this study demonstrates that the rise of FinTech represents not merely a technological change but a structural, cultural, economic, and social transformation. Banks are no longer merely financial intermediaries; they are evolving into service platforms. Business models have shifted from product-centered structures and traditional fee-based revenues toward platform-based, data-driven, collaborative, and ecosystem-oriented models. Customer experience has moved from costly, branch-based processes to fast, personalized, and always-accessible digital interactions. FinTech has redirected the competitive landscape toward collaborative value creation. The future of banking will therefore be shaped by data, platforms, APIs, artificial intelligence, and multi-actor collaboration rather than branches, paper forms, and waiting lines.

Author Contributions

All authors contributed equally to the conception, preparation, and writing of this manuscript.

Conflict of Interest

The authors, while observing publication ethics in the referencing, declare the absence of interest of conflict.

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Data availability

This article does not contain any Supplementary Material.

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