

How Fintech Innovation Transformed Finance: An SLR-Based Analysis from APIs to DeFi

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Abstract

The rapid advancement of digital technology has triggered a significant transformation in the global financial services industry, primarily through innovations in Financial Technology (fintech). This study aims to examine the evolution and impact of fintech innovations on modern financial service systems by employing a Systematic Literature Review (SLR) approach based on the PRISMA 2020 guidelines. A total of 25 articles published between 2015 and 2025 were thematically analyzed. The focus of the review encompasses four main pillars of fintech: digital payment systems, peer-to-peer lending, robo-advisory, and blockchain technology. The findings indicate that fintech innovations promote increased financial inclusion, operational efficiency, and accelerated digital transformation within the financial sector. Nevertheless, significant challenges remain, particularly concerning cybersecurity, regulation, and data privacy. This study provides a comprehensive literature mapping and highlights the need for collaboration between technology innovators and regulators to maintain financial system stability while fostering sustainable innovation.

Keywords: Fintech evolution, digital payment system, peer-to-peer lending, robo-advisory, blockchain.

1. Introduction

The development of digital technology has brought about a major transformation in the global financial services sector. Technology-based innovations, commonly referred to as Financial Technology (fintech), have revolutionized the way people access, use, and understand financial services. Fintech encompasses a range of solutions that integrate information technology with financial services, resulting in faster, more efficient, transparent, and easily accessible services for the broader public. Rapid advancements in technology and communication, accompanied by the widespread adoption of technology in financial services, have given rise to a new sector within the financial industry known as fintech. This sector holds significant potential to influence and shape the future direction of financial markets (Elsayed et al., 2024). Fintech companies are typically

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startups aiming to revolutionize the financial industry by offering platform-based digital services and products through the use of advanced technology (Barroso & Laborda, 2022).

The financial sector is undergoing a significant paradigm shift driven by advances in digital technology. Since 2018, fintech innovations have continued to evolve and transform, particularly accelerated by the COVID-19 pandemic. The most prominent types of fintech innovation today include payment services, clearing and settlement systems, digital wallets, peer-to-peer payments (such as paypal, Venmo, Zelle, and Square Cash), and digital lending platforms (such as Prosper and Funding Circle). In addition, digital currencies or cryptocurrencies have become a crucial component, introducing new payment systems and currencies not issued by central banks, such as Bitcoin, Litecoin, and Ripple. Developments in central bank digital currencies (cbdc), B2B payments, and digital foreign exchange platforms are also gaining traction. In market support services, distributed ledger technologies (DLT) like blockchain and smart contracts are receiving increasing attention (Gonzalez & Dandapani, 2025).

This research explores how digital technology is transforming four key areas: digital payment systems, peer-to-peer lending, robo-advisory, and cryptocurrency. These four domains form the foundation of today's financial revolution and demonstrate the potential impact of ongoing digital advancements (Gao, 2024). Previous studies also show that fintech encompasses various digital solutions, including mobile banking, online payments, peer-to-peer lending, robo-advisory, blockchain-based transactions, and AI-powered customer interfaces (Khan et al., 2023). In this study, the discussion focuses on these four pillars: enabling fast and secure transactions; facilitating direct connections between borrowers and lenders through peer-to-peer lending; providing automated investment management via robo-advisory; and enhancing security and efficiency in financial functions through blockchain, a software protocol operating over the internet. Blockchain paves the way for a new economy, serving as the foundation for digital assets, cryptocurrencies, and smart contracts (Kumar et al., 2025).

Fintech's role in expanding financial access is a relatively new but highly important topic that still requires deeper investigation (Ha et al., 2025). The rapid development of financial technology has facilitated the provision of more accessible financial services, such as mobile money services, particularly in areas underserved by traditional banking systems (Ha et al., 2025). Beyond merely expanding access to conventional financial services, fintech's impact is also closely linked to sustainable development goals. Recent studies indicate that fintech supports sustainable innovation, enhances energy efficiency, reduces carbon emissions, and promotes environmental conservation (Ha et al., 2025).

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The emergence of fintech is a response to various challenges faced by conventional financial systems. Previous research shows that digital developments have brought significant changes to the financial services sector. Fintech emerges as a competitor to traditional financial institutions, offering more accessible, consumer-oriented internet-based services. Currently, fintech business models cover a broad range of services, including financing, payment systems, wealth management, capital market activities, and insurance services (Suryono et al., 2021). In this context, fintech serves not only as a technological innovation but also as a catalyst for structural transformation in the global financial system. As stated by Ha et al. (2025), the role of fintech in enhancing financial inclusion is a new yet vital field that warrants further exploration. Since its rise in the mid-2010s, fintech has attracted significant attention due to its rapid growth and far-reaching impact across multiple aspects of life.

Understanding the potential benefits and challenges of these innovations is essential for anticipating industry changes and supporting informed decision-making in the financial world. Fintech is expected to disrupt the traditional financial services industry by creating new value chains and setting new standards for facilitating financial services in the business world. The key to fintech's success lies in value creation and a customer-centric orientation. Success is achieved by recognizing the needs of all customer segments and providing holistic solutions with minimal friction. To achieve this, the effective implementation of new technologies is crucial to adapting to customers' evolving needs (Kou & Lu, 2025). Fintech must continuously keep pace with changing times and consistently develop advanced solutions (Cai et al., 2019; Goodell et al., 2021; Gan et al., 2021; Kou & Lu, 2025).

Despite the growing adoption of fintech and the extensive body of research on its impacts, most studies remain partial and do not offer a comprehensive overview. There is still a lack of integrated analysis that examines the development, contributions, and challenges of the four core fintech components—digital payment systems, peer-to-peer lending, robo-advisory, and blockchain—within the context of modern financial services. To address this research gap, this study explores how fintech, as an innovative force in modern financial services, plays a role in integrating and influencing various aspects of the contemporary financial ecosystem. Utilizing a Systematic Literature Review (SLR) approach with sources from major databases such as Web of Science (wos) and Scopus, this study aims to present a comprehensive mapping of the literature on the evolution and impact of fintech innovations in modern financial services.

2. Literature Review

FinTech. FinTech, short for financial technology, first appeared in an industry report published by a global consulting firm in 2014. Over time, FinTech has gained widespread attention due to its

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rapid development and significant impact on various aspects of life. The term FinTech is often used interchangeably with “digital finance” or “internet finance,” particularly in China, where “internet finance” is more commonly used. Several studies also define FinTech as encompassing information and communication technologies, electronic money, digital payments, and mobile banking services (Ha et al., 2025).

FinTech is reshaping the financial market landscape and how financial products and services are designed and delivered. As an integration of the finance and technology sectors, FinTech has had a profound impact on the stability of the financial system by influencing markets and transforming business models, which in turn fosters innovation across the global financial ecosystem. In developed countries such as the United States, the United Kingdom, and Singapore, this synergy between technology and finance has not only led to advanced financial solutions but also driven the development of responsive regulatory frameworks that support the rapid growth of financial technology. Conversely, in developing and transitional economies, FinTech serves as a key driver for expanding financial access, particularly for individuals and micro-entrepreneurs, by offering essential services such as loans, investments, and insurance, thus helping to overcome widespread financial inclusion challenges. Moreover, FinTech significantly influences consumer and business behavior and decision-making by expanding service access and offering financial products tailored to user needs. In addition, it accelerates business transformation and sustainability by leveraging advanced technologies to create scalable, efficient financial solutions, enabling financial institutions to extend their reach, serve more clients, and adapt to the dynamic and challenging global economy (Elsayed et al., 2024).

Literature also highlights the disruptive impact of FinTech on the financial sector. Although FinTech innovation improves financial services, its emergence blurs traditional boundaries between service providers and lowers market entry barriers, posing regulatory challenges and potentially affecting the stability and trust in financial systems. One phenomenon is the risk spillover between FinTech firms and traditional financial institutions, especially during periods of market downturn. Studies show that such risk spillovers tend to increase alongside technological advancements, indicating that traditional financial sectors become more vulnerable to negative impacts during such times (Elsayed et al., 2024).

Digital Payment Systems. Digital payments, also known as electronic payments, refer to the process of transferring value from one payment account to another via digital devices such as computers, mobile wireless networks, or digital communication channels like SWIFT. Digital payments are an essential and inseparable part of e-commerce. The widespread popularity of e-commerce is largely due to the convenience of online transactions, which allow buyers and sellers to exchange goods and services over the internet. In this context, commercial transactions

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conducted through e-commerce are transformed into electronic money transfers, enabling digital payment processes (BABUŞCU & HAZAR, 2023).

Another definition states that digital payment refers to financial services accessed and provided through digital channels, including mobile devices (Agur et al., 2020). Although exchanges between various business partners still occur on e-commerce platforms, cash-based systems are gradually being replaced by digital payment systems. Within this framework, digital payment systems can be understood as inter-organizational information systems that connect numerous corporate and individual clients for money-related transactions (METU-OCW, EPS) (BABUŞCU & HAZAR, 2023).

Compared to traditional payment methods, online transactions require less manual labor and written documentation. Consequently, electronic payments streamline operations in the banking and retail sectors by eliminating unnecessary processes, thereby reducing operational costs. This streamlined system also shortens transaction times, allowing payments to be completed within seconds thanks to real-time processing. Due to these advantages in speed and efficiency, online payments have become the preferred method, especially among businesses. Every electronic transaction leaves a digital footprint (Gao, 2024). Digital receipts and financial statements are automatically recorded in online payment systems, enabling individuals to conveniently track their spending and income. With further data analysis, users can manage their finances and adjust their consumption efficiently. For governments and banks, online payments offer a more transparent method of monitoring and regulating transactions than cash. Cybersecurity systems can trace the path of each transaction and consolidate them in a central platform. Administrators can detect irregularities to prevent potential illegal activities and analyze data to investigate financial crimes (Gao, 2024).

Peer-To-Peer Lending. Peer-to-peer (P2P) lending is one of the rapidly evolving topics in digital finance studies. This business model connects borrowers and lenders through a digital platform. P2P lending operates online, where funding requests are first evaluated by an investment committee before disbursement. As a two-sided e-commerce model, P2P lending has drawn particular attention in terms of risk control, especially in assessing and screening potential borrowers to minimize credit risk (Suryono et al., 2021). Several studies have attempted to reduce prediction errors in P2P lending businesses. For instance, a two-stage approach proposed by Fu et al. (2020) and Suryono et al. (2021) integrates deep learning and bidirectional long short-term memory (BiLSTM) models to evaluate default risks based on keywords extracted from investor comments. Beyond credit risk control, P2P lending involves a series of business processes, including borrower registration, credit risk evaluation, fund disbursement, collections, repayment, and investment procedures for lenders. Furthermore, recent research highlights that political and

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financial factors can influence the sustainability of P2P lending platforms. Platform failures—whether due to bankruptcy or fraudulent actions by platform operators—remain one of the industry’s biggest challenges (Suryono et al., 2021).

Peer-to-peer lending, conducted without involving traditional financial institutions, offers more affordable interest rates and flexible terms for borrowers. This model maximizes free negotiation potential between borrowers and lenders, allowing both parties to mutually determine interest rates, loan terms, and repayment methods. Thus, P2P lending serves as an effective alternative for those unable or unwilling to take on long-term, high-cost mortgages, significantly reducing financial burdens. It is also particularly suitable for microfinancing needs such as personal loans, education expenses, and small business funding (Gao, 2024). Lenders, on the other hand, benefit from returns determined by the agreed interest rates and loan duration. Compared to conventional loans, P2P systems require lighter financial conditions and shorter repayment periods, making them attractive to individual investors. For example, the LenDenClub Int website offers loan terms ranging from 3 months to 6 years, with a minimum investment of only USD 120. Small-scale investments help minimize financial risk, while short tenors deliver faster returns. As a result, more small investors are drawn to invest through P2P lending platforms for quick and stable gains (Gao, 2024).

Robo-Advisory. Robo-advisory refers to software applications designed to provide financial advice to users. The initial concept of this software emerged in the early 2000s, and the first generation of robo-advisors became widely adopted by financial consultants and wealth managers in the following decades. As artificial intelligence (AI) technology advanced, robo-advisors became more accessible to the general public and began to be considered a viable alternative to human financial advisors. By 2022, robo-advisor service providers had managed assets totaling USD 360 billion and served over one million users in the United States (Gao, 2024). The remarkable success of robo-advisors has sparked debate about whether this technology could eventually replace human financial advisors. Central to this debate are issues of recommendation accuracy and ease of access. Robo-advisors operate based on algorithms that process user data such as financial statements, return expectations, risk tolerance, investment preferences, and investment horizons. Based on this analysis, the system provides consistent, objective financial advice in real time. Unaffected by personal biases or conflicts of interest, robo-advisors are often perceived as more trustworthy by users with limited financial literacy. Surveys indicate that over 50% of respondents consider robo-advisors to be more ethical than traditional advisors (Gao, 2024). Nevertheless, because robo-advisor decisions are entirely based on algorithmic design, they may lack flexibility in adjusting advice to dynamic market conditions or the specific needs of users. In contrast, human financial advisors can offer more personalized approaches. With the expertise

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of seasoned professionals, users can gain deeper insights into their financial situation and explore new investment opportunities, resulting in more comprehensive and adaptable financial planning. However, consultations with human advisors typically require more time, making response times slower compared to robo-advisors (Gao, 2024).

Blockchain in Financial Services. Blockchain is a digital ledger system composed of interconnected blocks of data that form a chain. This structure consists of blocks, chains, nodes, and master nodes. While blockchain technology serves as the foundation of cryptocurrencies like Bitcoin, its application extends far beyond financial transactions. Blockchain is also used to securely manage and store various types of data in a tamper-resistant manner. In the financial sector, blockchain has gained traction for its ability to ensure data security and transaction reliability. In banking, blockchain has found a strong foothold due to its ability to guarantee secure, dependable, and valid financial processes, as evidenced by the rising popularity of cryptocurrencies (Javaid et al., 2022). Today, blockchain technology is recognized for its transformative impact not only on banking and financial services but also across various industries. Blockchain is decentralized, transparent, anonymous, and immutable. It utilizes encryption technology to facilitate digital currency—a new, safer, and more efficient medium of exchange than physical money. Blockchain acts as the foundational technology that maintains digital transaction ledgers. In recent years, blockchain applications have extended to nearly all sectors—from manufacturing and supply chain management to financial services. This technology holds great potential to disrupt financial services by eliminating numerous inefficiencies and obstacles within fintech operations (Kumari Anitha & Devi Chitra N, 2022).

Historically, banks were established to unify communities within a secure and efficient trading and transaction system. Today, blockchain platforms enable global transactions to be conducted more easily, quickly, and reliably. The global financial system, which serves billions of people daily and processes trillions of dollars in transactions, faces longstanding challenges such as the involvement of multiple intermediaries, sluggish processes, excessive documentation, and data breaches—leading to significant annual losses. Blockchain is seen as a solution to these systemic issues (Javaid et al., 2022). Despite technological advancements addressing many problems, each innovation brings its own challenges. The abundance of fintech solutions often makes it difficult for financial service providers to choose the most suitable option. Consequently, they seek integrated solutions that can address problems holistically. Blockchain emerges as a promising technology capable of tackling major pain points in the financial sector. On the other hand, due to the centralized nature of traditional financial systems, financial service firms must allocate investments across many areas, such as accounting, database management, value transfer systems, data security, labor costs, and intermediary fees. These recurring expenses contribute to the high

cost of traditional financial systems. Blockchain has the potential to streamline this cost structure by offering a more efficient, transparent, and decentralized alternative (Javaid et al., 2022).

Integration of AI, Machine Learning, and Blockchain in Finance. The convergence of artificial intelligence (AI), machine learning, and blockchain in the financial domain has the potential to redefine the provision of financial services, enhance security protocols, optimize operational efficiency, and accelerate decision-making paradigms. Ongoing developments illustrate how the integration of these technologies is transforming the boundaries of financial disciplines (Davenport & Ronanki, 2018; Xu et al., 2019; Ali et al., 2020; Dwivedi et al., 2021; Van et al., 2021; Martin & Nagel, 2022; Kou & Lu, 2025).

3. Research Method

A systematic literature review helps to identify publications based on predefined eligibility criteria, assess existing knowledge, and derive reliable findings and recommendations for policymakers, practitioners, and academics. Various protocols used for conducting systematic literature reviews include the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021).

Research Design. This study is structured into three main stages: (1) Identification: Gathering literature from various scholarly sources. (2) Selection and Evaluation: Screening based on inclusion and exclusion criteria, as well as assessing methodological quality. (3) Thematic Synthesis: Organizing and analyzing findings based on emerging key themes.

Research Questions. This study aims to answer two main questions: (1) How has FinTech innovation evolved in financial services over the past decade? (2) What are the main impacts of FinTech on modern financial service systems and practices?

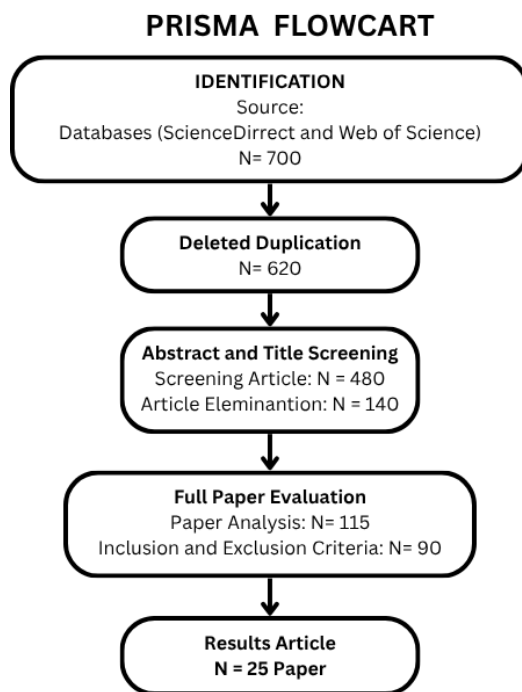
Sources and Search Strategy. The literature search in this study utilized easily accessible websites from three databases: Scopus, Web of Science, and ScienceDirect. The journal search employed keywords designed to broaden or specify the search, facilitating the selection of relevant journals. The search was limited to articles published between 2015 and 2025. The keywords used were: “Financial Technology” OR “FinTech”, “Digital Payment Systems”, “Peer-to-Peer Lending”, “Robo-Advisor”, and “Blockchain in Finance”.

Inclusion and Exclusion Criteria. The following are the inclusion and exclusion criteria based on (Page et al., 2021) for the literature study: (1) Inclusion: (a) Peer-reviewed studies published in English. (b) Studies discussing FinTech innovations or technologies in the context of financial services. (c) Studies explaining the impact of FinTech on the financial sector. (2) Exclusion: (a) Non-scientific articles such as editorials, opinions, or blogs. (b) Duplicates or different versions of

the same report. (c) Studies irrelevant to the research questions. (3) Study Selection Process. The selection was carried out in three stages: (a) Title and Abstract Screening: To identify initial relevance. (b) Full-text Review: Thorough analysis of relevant studies. (c) Documentation and Synthesis: Studies that passed were coded and thematically analyzed.

The selection process is illustrated in a PRISMA diagram, showing the number of publications at each stage. The results of the article selection can be depicted using the PRISMA diagram:

Figure 1. Prisma Diagram (proceed by author, 2025)



A total of 25 articles were selected for further analysis. Data from these articles were systematically extracted and analyzed using a thematic synthesis approach to identify patterns, trends, and gaps in the literature. The validity of the process was maintained through independent review by two researchers and thorough documentation of the selection and synthesis procedures. The main limitations of this review include the restriction to English-language publications and selected databases, as well as the absence of quantitative meta-analysis due to the heterogeneity of the studies.

4. Finding and Discussion

The database search (Scopus, Web of Science, and ScienceDirect) yielded a total of 700 articles. After removing duplicates ($n = 80$), 620 articles were screened based on their titles and abstracts. A total of 115 articles were assessed in full-text, and finally, 25 studies met the inclusion criteria for further analysis.

Table 1. Study Characteristics

Aspect	Category
Count of Article Analysis	25
Year of Publication	2015–2025
Research Location	Asia (10), Europe (6), North America (5), Africa (2), Global (2)
Research Focus	Quantitative (13), Qualitative (7), Mixed-methods (5)
Main Focus	Fintech Evolution (10), Fintech Impact (15)

Table 1 provides an overview of the characteristics of the 25 articles analyzed during the 2015–2025 period. The majority of the studies were conducted in Asia, reflecting the rapid growth of FinTech in the region. Quantitative methods dominated the research, indicating a strong focus on measuring empirical impacts. The studies were categorized into two main areas of focus: the evolution of FinTech (10 studies) and its impact on financial services (15 studies), highlighting a balanced interest between technological development and its implications.

Evolution of FinTech Innovation (2015–2025). (1) Phase 1 (2015–2017): Initial Disruption and FinTech Adoption: (a) Focused on peer-to-peer lending, mobile payments, and e-wallets. (b) Studies in developing countries indicated an increase in digital financial inclusion through services such as M-Pesa, GoPay, and Alipay. (2) Phase 2 (2018–2020): Integration of AI and Big Data: (a) Significant rise in the use of AI for credit scoring, robo-advisors, and chatbots. (b) Research showed up to 40% improvement in operational efficiency within banking services. (3) Phase 3 (2021–2023): Open Banking and Adaptive Regulation: (a) FinTech firms began collaborating with traditional banks via APIs, following policies such as PSD2 (Europe), OJK Sandbox (Indonesia), and the MAS FinTech Regulatory Sandbox (Singapore). (b) Studies highlighted that these collaborations enhanced user trust and system stability. (4) Phase 4 (2024–2025): DeFi, Web3, and Hyper-Personalization: (a) FinTech started integrating with decentralized finance (DeFi) systems and Web3 technologies. (b) Increased use of blockchain, asset tokenization, and smart contract-based financial services. (c) Regulatory challenges and data security emerged as key concerns in recent research.

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The Evolution of FinTech Innovation in Financial Services. The period 2015–2025 is chosen as the focus of this study as it represents a full decade of the most dynamic developments in the era of FinTech 3.0. The evolution of FinTech during this time shows a continuation and maturation of the FinTech 3.0 phase as explained in the studies by Arner et al. (2015) and Sanga & Aziakpono (2023), which present the FinTech journey beginning in the 1860s and its development across three distinct phases: (a) FinTech 1.0 (1866–1967) enabled rapid transfer of financial services following the installation of the trans-Atlantic cable and the telegraph. (b) FinTech 2.0 (1967–2008), which included SWIFT, ATMs, electronic payments, settlements, and banking, improved the delivery of conventional financial services and products. (c) FinTech 3.0 (2008–present) comprises innovative financial services and products that are transforming and expanding financial services, including both intermediated and disintermediated financing. This phase marks a shift from financial development toward financial inclusion and the enhancement of alternative financing schemes.

Previous studies also highlight that by revolutionizing payment and deposit services, FinTech companies have introduced digital wallet solutions for fast, reliable, and easily accessible transactions. FinTech provides online platforms that electronically enhance access to financial services. E-wallets enable direct payment transactions by transferring funds from one wallet to another using only a mobile phone number as the key identifier—no account details are required (Kumari Anitha & Devi Chitra N, 2022). FinTech has also transformed traditional roles in financial investment advisory services. This technology disrupts the financial industry by delivering outcomes once predicted only by conventional financial systems. FinTech firms in this sector offer high-tech investment advisory services via digital platforms, enabling customers to automatically invest in financial products. These platforms, known as robo-advisors or digital advisory services, promote efficient and automated investment processes (Kumari Anitha & Devi Chitra N, 2022).

In the evolution of FinTech, its role as a bridge between national and international banking brands and local markets is becoming increasingly important, as seen in cases like Groupon. This readily applicable business model facilitates the distribution of services to regional communities with tailored offerings, while still collaborating with established brands and small-scale local retailers. These findings align with Anagnostopoulos et al. (2025), who explain how FinTech has evolved to balance the power of global branding with local accessibility. FinTech now operates across a wide spectrum—from small vendors to international brands—effectively penetrating various market segments. This reflects the maturity and diversification of FinTech innovation in supporting financial service inclusion and expansion. Compared to traditional banks and lending institutions, FinTech solutions are better positioned to provide quick access to emergency funds and loans, especially for low-income or unbanked individuals (Ozili, 2018; Kumari Anitha & Devi Chitra N, 2022). Peer-to-peer (P2P) digital lending platforms serve as intermediaries between fund providers

and borrowers. Individuals with available funds can directly lend to those in need via digital platforms and earn interest in return.

The evolution of FinTech has also triggered diverse responses from decision-makers and users of these services. As noted in a study by Fatima & Chakraborty (2024), trust, anxiety, performance expectations, and the preference for human advisors influence the intention to use robo-advisors in India. Among younger users, trust and anxiety play a major role, while for investors over 45, anxiety is the dominant factor. Anxiety is significant across both genders; however, for highly knowledgeable investors, anxiety negatively impacts the intention to use robo-advisors. Interestingly, for investors with high financial literacy, anxiety is negatively correlated with behavioral intent to adopt these services. The study also found that the publicly available performance results of robo-advisory services positively contribute to increasing users' performance expectations. Therefore, in line with its evolution, FinTech has progressed from offering basic services to advanced solutions such as AI- and data-driven robo-advisors. Public dissemination of these success stories accelerates adoption, expands financial inclusion, and enhances public trust—marking the maturity and widespread acceptance of FinTech innovation.

The Impact of FinTech on Financial Services. The results of the literature review indicate that FinTech can significantly expand financial inclusion by overcoming geographical barriers and high costs that have long been major obstacles. However, there are also significant challenges, particularly in terms of cybersecurity and regulatory frameworks. Several previous studies suggest that FinTech not only influences the ease of financial access but also impacts environmental performance. A study by Waqar et al. (2025) identifies two key findings. First, financial access (FA) through FinTech has a significantly positive effect on environmental and economic sustainability performance among Small and Medium Enterprises (SMEs). FA promotes environmentally friendly investments, reduces emissions, and enhances financial access through cost-efficient digital solutions. Second, FA contributes positively to green innovation, enabling SMEs to develop environmentally friendly solutions through green finance utilization and improving operational efficiency. In addition, FA positively affects Cleaner Environmental Practices (CEPs), such as optimizing resource management and reducing waste, aligned with the benefits of blockchain technology in enhancing supply chain transparency (Waqar et al., 2025). Other studies show that FinTech, as an open innovation, has encouraged banks to adopt scientific marketing strategies in developing e-banking services. Through one-to-one marketing and customer database utilization, banks are able to identify specific customer needs and offer personalized services. The advancement of information technology and databases makes this approach more effective and efficient, allowing banks to track customer behavior, meet expectations, and comply with international standards (Molavi et al., 2025).

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The rapid development of FinTech has been driven by technological advancements such as Artificial Intelligence (AI), big data analytics, machine learning, blockchain, and distributed ledger systems. These innovations not only support the delivery of financial services but also give rise to new business models led by FinTech startups and IT companies (Koranteng & You, 2025). The same study emphasizes that peer-to-peer (P2P) lending functions not only to serve borrowers who are excluded from traditional banks but also to empower them to move up the financial ladder. This empowerment includes increasing knowledge, skills, income, self-confidence, and the possession of required documentation. Hence, P2P lending proves to be a strategic instrument in promoting financial inclusion and economic empowerment for marginalized communities. Ryu & Min (2025) examined how different combinations of FinTech attributes can lead to high usage rates using the fuzzy-set qualitative comparative analysis method. Drawing on innovation diffusion theory and the information systems success model, the study developed a framework encompassing three main dimensions of FinTech: innovation, financial services, and information technology (IT). The research revealed complex relationships among these dimensions, including concepts of conjunction, equifinality, and asymmetry.

The analysis of four types of FinTech—mobile payments, mobile remittance, P2P lending, and crowdfunding—showed that the role of IT varies, from supportive to potentially inhibiting adoption. Therefore, it is crucial for FinTech providers to understand these interactions in order to formulate effective product development and launch strategies. Furthermore, the literature indicates that FinTech companies must pursue continuous innovation to remain relevant and sustain growth. Research by Anagnostopoulos et al. (2025) emphasizes that FinTech firms need to develop both broadly applicable innovations and specialized integrated solutions, such as WealthTech, quote aggregators, and InsurTech. Additionally, the market power of BigTech firms is largely based on endogenous feedback loops that generate vast amounts of consumer data within their platforms. Although FinTech has enhanced the efficiency and accessibility of financial services, its rapid advancement also brings challenges, including intense competition and concerns over data privacy and security. Anagnostopoulos et al. (2025) predict that the FinTech market will reach full maturity in the coming years, driven by continuous revolutionary technological developments. In response, regulators are expected to intensify efforts to manage the risks emerging from these innovations. An adaptive and collaborative regulatory approach is required—one that balances financial system stability, data and consumer protection, and healthy market competition. Such a regulatory framework is essential to ensure that FinTech innovation continues to flourish without compromising user security and fairness.

5. Conclusion

This study concludes that FinTech has undergone significant evolution over the past decade and plays a strategic role in the transformation of modern financial services. Innovations such as digital payment systems, peer-to-peer (P2P) lending, robo-advisory, and blockchain not only enhance efficiency and financial inclusion but also create new, more adaptive, and user-centered service models. However, these advancements also bring challenges in terms of regulation, data protection, and user trust. Therefore, the future development of FinTech must be grounded in continuous innovation, adaptive regulatory frameworks, and synergy between technology and policy to ensure maximum benefits for society and the overall stability of the financial system.

This study provides important implications for practitioners, regulators, and academics. For financial practitioners, the findings emphasize the need for continuous innovation and the adoption of digital technologies to address FinTech disruptions. For regulators, adaptive policies are required to maintain a balance between innovation and consumer protection. Meanwhile, for academics, this study opens opportunities for further research on the integration of advanced technologies and their impact on financial inclusion and sustainable development. This study is limited to English-language literature and specific academic sources, which may result in underrepresentation of the latest innovations or studies published in other languages. Additionally, most of the data is conceptual and focuses on developed countries, providing limited insights into the conditions of developing nations. Broader empirical research is needed to achieve a more comprehensive understanding.

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