
Is Fintech Just an Innovation? Impact, Current Practices, and Policy Implications of Fintech Disruptions

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Abstract

FinTech has successfully challenged the established finance landscape and diversified its entry into socio-economic and sustainable platforms. On the contrary, it poses significant security, legislative, and law enforcement issues and may amplify the potential for fierce rivalry in the financial system. This study has identified four broader applications of FinTech that drive widespread FinTech adoption: banking, financial inclusion, regulation, and sustainability. The paper has discussed the multifaceted impact of FinTech, analyzed current technologies, and trends shaping FinTech and examined the policy implications in each of the key areas. We explored research articles and employed a narrative perspective. FinTech has broken down barriers for marginalized, unbanked populations through more accessible digital credit and leveraged the technological infrastructure for a smooth transition to a low-carbon economy. Adopting innovative technologies such as crowdfunding, big data analytics, blockchain, and artificial intelligence have established strategic decentralization and sped up ecological transition. However, since unregulated FinTech use can worsen existing financial problems and create more information asymmetry, establishing a regulatory framework with proper supervision that prioritizes client interests, data privacy, and risk management is crucial. As more and more financial institutions embrace the digital revolution, we anticipate a lot of positive outcomes, such as balanced regulation, an improved sustainable financing environment, and greater access to financial services for everyone.

Keywords: FinTech, Regulation, Financial Inclusion, Sustainability, Banking, Technology and Policy

1. Introduction

The subject of financial technology (FinTech) has garnered significant attention in recent times, mainly due to its perceived capacity to disrupt the entirety of the financial system. Schulte & Liu (2017) implied that financial institutions are employing Artificial Intelligence (AI) and machine

learning methodologies across several domains to execute operations involving the input of data, risk evaluation, and loan application processing. The financial system has experienced significant technological and regulatory transformations, primarily influenced by factors such as deregulation and liberalization, advancements in information and communication technology, innovative transaction, and savings solutions, shifts in cyber security practices, and the process of digitization.

There is a lack of scholarly research that specifically focuses on the thorough assessment of financial technology (FinTech), which includes an examination of its status and implementation, its impact on the profitability of banks, its role in promoting financial inclusion, and a critical evaluation of the policy implications, such as regulatory, monetary, and prudent policies. Hence, the primary objective of this study is to fill these research gaps and build a holistic overview of the disruptions, current practices, and policy guidelines. This study seeks to provide a comprehensive and critical analysis of the current body of FinTech research, focusing on three key topics that require further exploration: impact, current practices, and policy implications.

This study provides scholars with valuable insights into the current state and practices of financial technology and its impact on the in-banking industry, financial inclusion, regulation, and sustainability. Furthermore, this study presents an extensive array of policy proposals, including sustainability, regulatory, technological, and monetary aspects. These recommendations aim to contribute to the advancement of the discourse surrounding FinTech. A thorough evaluation of the current body of literature is conducted to achieve the objectives, with particular emphasis on studies that have utilized a narrative perspective.

The primary finding of the study reveals that FinTech facilitates the promotion of sustainable development through the implementation of green crowd funding and environmentally friendly sustainable financing products. The emergence of FinTech has changed the banking paradigm by enhancing the accessibility of financial services. This enhanced convenience has brought security breaches, cyber-attacks, money laundering, and payment defaults. The unregulated use of FinTech has the potential to amplify existing problems within the financial system, leading to increased borrowing, investment, and consumption among families with limited financial literacy. The implementation of an efficient monetary policy within the FinTech business necessitates the establishment of a regulatory framework that considers the safeguarding of client interests, the preservation of data privacy, and the implementation of robust risk management protocols. We recommend that regulatory authorities adopt a cautious approach towards allowing FinTech firms to leverage their technological capabilities in the realm of shadow banking.

Our contribution to the body of scholarly literature and the discourse within public policy, innovation, and the financial system can be categorized into four distinct aspects. First, this study investigates the influence of FinTech on financial sectors, explores the role of FinTech in promoting cost-friendly financial solutions for marginalized economies, and provides a detailed analysis of the regulatory frameworks and laws governing FinTech. Secondly, the present study provides an extensive assessment of FinTech prevailing in open banking solutions by offering distinctive value propositions. Thirdly, this study shows the current practices of FinTech, providing that the utilization of cutting-edge technologies such as machine learning, blockchain, big data analytics, crowd-funding, and artificial intelligence has significant promise in

sustainability and economic and financial endeavors. Finally, the study takes a comprehensive review of regulatory risk, technological biases, and policy implications in FinTech, recommending that regulatory authorities should establish comprehensive FinTech rules to ensure equitable conditions and flexible regulations.

2. Literature Review

Previous studies have concentrated on various domains within FinTech. Some previous studies have primarily concentrated on examining the effects of FinTech on the banking industry (Varma et al.,2022; Navaretti et al.,2018), as well as critically evaluating the impact of FinTech on sustainability (Mhlanga, 2022; Arner et al.,2020) Other researchers, for example, Allen et al. (2021), Iman (2020), and Jagtiani & John (2018) have emphasized the technical transformations inside the FinTech industry. There needs to be more comprehensive research that examines the effects of FinTech on financial institutions, specifically with an emphasis on FinTech disruptions spanning out the financial system and policy discussion in each of the divergent effects arising from the FinTech revolution. The present study exclusively examines distinct facets of FinTech, including FinTech lending, financial inclusion, sustainability, regulation, and a comprehensive overview of the FinTech landscape.

Varga (2017) discussed the new financial era where the conventional financial landscape was already evolving into more convenient and customer-friendly solutions, especially for the unbanked global segment of economies outside the banking umbrella. Tok & Heng (2022) and Bhuiyan et al. (2024) found that FinTech services such as mobile money and e-wallets in many remote regions of underdeveloped or developing countries provide cost-friendly financial services. According to Morgan (2022) and Ali et al. (2023), financial inclusion is the outcome of lost-cost financial services targeted to marginalized households and small enterprises. Recently, Akartuna et al. (2022), Ahammed & Arif (2018), Chakraborty et. al (2017), and Gaviyau & Sibindi (2023) manifested that global financial industries have been inadvertently affected by severe disruptions like money laundering, terrorist financing risk, financial data leaks, cyber-attacks, identity theft, and other fraudulent activities. Muganyi & Sun (2021) conducted a comprehensive analysis of the impact of Green FinTech on China's environment and found that integrating FinTech has helped the Chinese economy reduce sulfur dioxide emissions and increase investments in environmental protective initiatives.

The accelerated growth of FinTech in recent years can result from the adoption of digital payments and mobile money. The household's consumption of goods and services has increased with the dissolution of paper currency and the development of new payment technologies. Haddad & Hornuf (2018) found that FinTech activities are more in the countries that are well-developed and where the number of mobile phone subscriptions and security of internet servers are readily available. Furthermore, Navaretti et al. (2018) suggested that regulatory arbitrage plays a role in investment in FinTech firms. They also found that FinTech investment is lower where the banking sector regulation is more stringent. Many academic researchers and professionals have argued over the multifaceted application of FinTech and highlighted potential vulnerabilities that need to be well addressed with concrete guidelines and a high degree of supervision and compliance. While Arner et al. (2017) commented that, financial regulators must develop new regulations that can reflect financial solidity and consumer protection, Chen & Volz (2020) concluded that FinTech has the potential to complement traditional capital markets and

aid in mobilizing financial resources for sustainable infrastructure investments. Regulators proposed an effective reporting system and a better compliance system for controlling internal risks and reducing compliance costs considering the aftermath of the 2008 financial crisis. Arner et al. (2015) stated that RegTech helps the industry with compliance and reporting with the regulation and assists regulators in developing better regulations and supervision for the FinTech industry.

3. Methodology

The study aims to provide in-depth discussion and critical assessment, from the emergence of FinTech to policy concentration, to bridge the gap between academic research and practical implications. We attempted to discuss the FinTech journey from its disruptive phase to gradually claiming a force in the finance world. As the FinTech world is getting increasingly complicated, we took a holistic approach to examine the existing literature in three broader parts: impact, current practices, and policy implications. Under each area, we took a more granular view and examined the recent literature on how FinTech is reshaping the financial revolution. This study is unique in that, while the existing literature discusses only a particular area of FinTech, this study attempts to investigate FinTech from a diversified portfolio. We analyzed the relevant studies for each topic area, comprehended the recent information available, and aimed to unfold any existing gap through policy discussion.

Since our study considers a broader approach to understanding FinTech, we reviewed the existing literature from a narrative perspective. Boell & Cecez-Kecmanovic (2015) stated that having a narrative approach to reviewing literature allows the researcher to be more judgmental in classifying the study and critically evaluating the significance and outcomes of the study. This discretion can add more novelty to the study. Following this approach, we searched for relevant peer-reviewed journal literature from open-access journals and index journals such as Scopus-Elsevier and Emerald. To ensure the relevance of the studies, we ensured that the journal matches the respective discussed topics of each segment: FinTech impact, current practice, and policy implications.

4. FinTech Impact

In this ever-evolving global financial industry, adapting modern technology is an inevitable initiative required to elevate the quality of existing financial services and create and deliver innovative, customer-friendly financial service portfolios. However, the prime question is, 'To what extent is this new financial revolution impacting the global economy, and what are its future consequences?' Figure 1 shows the impact and complexity matrix, outlining the numerous impacts of FinTech solutions and the degree of challenges in its full-fledged adoption. From the literature presented by scholars worldwide, we can say that various economies enjoyed the upsides of implementing FinTech with a little downside.

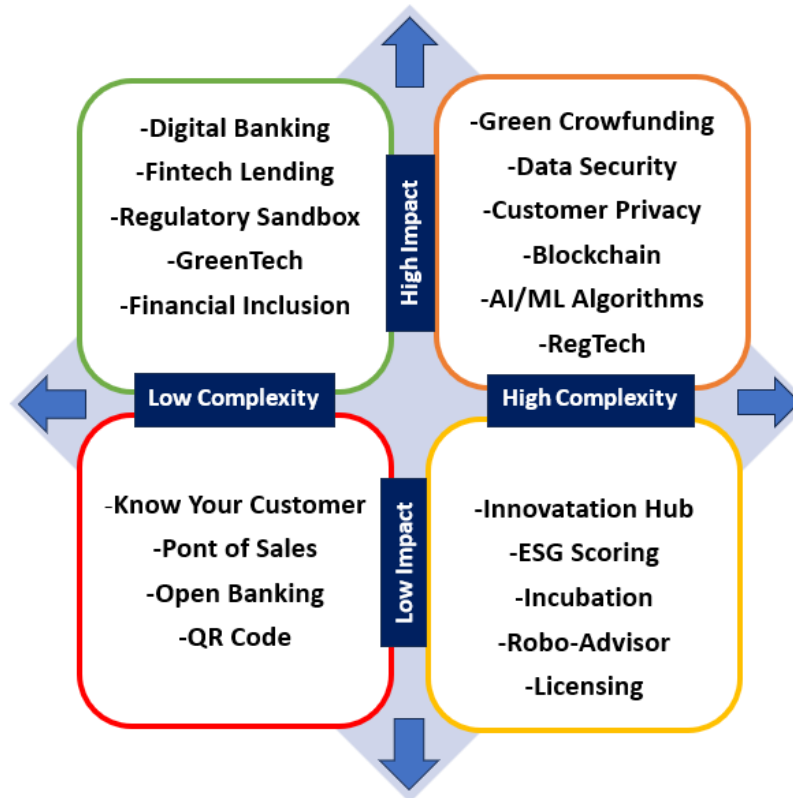


Figure 1: Impact – Complexity Framework of FinTech Solutions
Source: Authors’ Analysis

3.1 Transforming Banking Landscape

In conjunction with the pervasive availability of internet connectivity and the omnipresence of smart phones, the rapid progress of information technology has significantly influenced the banking and financial services sectors. FinTech companies have introduced mobile wallet options that offer secure payment processing, rapid transaction speeds, and convenient accessibility through an electronic wallet. Varma et al. (2022) concluded that implementing FinTech has the potential to benefit the global banking industry with enormous profits, cost reduction, and improved systematic financial stability while dampening the adverse impact of FinTech disruption and fierce rivalry. In another quantitative study, Chhaidar et al. (2022) suggested that FinTech-driven large banks in Europe are poised with the opportunity to increase their performance and, thereby, their profit potential if the economy can pump money into their investments in financial technologies. However, According to Safiullah &Paramati's(2022) research on banking institutions in Malaysia, FinTech firms positively influence the financial stability of small banks, banks with low corporate governance, and Islamic banks. Pham et al. (2024) examine the impact of the growth of financial technology (fintech) on the performance of banks in Vietnam. It has been discovered that Fintech has a substantial and beneficial effect on the profitability of Vietnamese banks. Their report also

proposes that banks should contemplate the establishment of a dedicated department for gathering fintech news. Subsequently, this information should be analyzed and regarded as a pivotal element in formulating a strategy to effectively respond to the advancements in fintech. The available literature shows that FinTech innovations can enhance the economic viability of business models, thereby helping banks achieve overall financial wellness.

FinTech adoption has ushered in challenges and negative consequences for existing traditional banks and their counterparts. Previous scholarly research by Yudaruddin (2023), Sabuj et al. (2019), Zhao et al. (2022), and Phan et al. (2020) indicated that the emergence of FinTech and its associated products generated a negative impact on the financial performance of traditional banking institutions. This effect is particularly pronounced among large state-owned commercial banks. The introduction of FinTech will significantly impact banks' profitability in the short term; however, in the long run, it will likely create intense competition and additional costs, especially if banks continue to adhere to the traditional way of doing business.

3.2 Fostering Financial Inclusion

FinTech has revolutionized urbanization in economies by increasing the accessibility and affordability of financial services by making them available to those in the economy who were previously excluded from financial transactions. Financial services are now different function-wise due to financial inclusion and FinTech, which have revolutionized how individuals manage their finances, including saving, borrowing, investing, and transferring funds. Financial Inclusion aids in the reduction of poverty and improvement of well-being in developing nations, especially in Africa (Djahini-Afawoubo, Couchoro & Atchi, 2023). Chen, He, & Li (2024) discover a substantial influence of Fintech on the operations of banks. According to them, the utilization of mobile banking in China can improve banks' financial inclusion through the development of Fintech. Mobile banking and digital payments have a beneficial impact on the financial inclusion index in Balkan countries (Miftari, Shabani & Hashani, 2024). Demir et al. (2022) argue that financial inclusion represents a significant FinTech avenue for mitigating income inequality. FinTech can cater to specific segments of individuals who do not possess bank accounts within the conventional financial market and can offer financial products in remote regions far from established financial institutions. The widespread use of FinTech has empowered digital credit platforms. As a result, a better lender-customer relationship has led to convenient credit facilities, better customer satisfaction, and an improved monitoring system, resulting in financial inclusion and economic development. Velazquez et al. (2022) found that Peru enhanced quality of life by successfully implementing mobile money services within the FinTech industry and ensuring the favorable outcomes of digital lending infrastructure. However, a decline in trust in digital technology and insufficient client privacy could hinder the advancement of financial inclusion. On the other hand, FinTech serves households and small and medium enterprises (SMEs) and offers low-cost, collateral-free credit with superior customer service to SMEs. Sahay et al. (2020) concluded that Point-of-Sale (POS) systems help small and medium-sized enterprises (SMEs) collect electronic payments. This mechanism fosters more comprehensive economic growth in marginalized small businesses by providing savings, investment, consumption smoothing, and insurance opportunities.

3.3 Reshaping Regulation

In this era of digitalization accompanied by FinTech evolution, the financial paradigm is becoming more dynamic and exciting. FinTech is continuously experiencing continuous development and improvement in its means of creating, operating, and delivering services, but these all come with significant risks. Restoy (2019) found that regulators worldwide face challenges in creating an adequate policy framework that will simultaneously support the growth of FinTech and monitor its demerits. Faccia et al. (2020) highlighted the latest fraud cases in the FinTech Industry, which included Danske Banks International money laundering in 2018, Crypt Capital Corruption in 2019, And Coin Ninja, Bestmixer.io, and Wirecard in 2020. These real-life examples indicate that FinTech also has its vicious dark side, which requires strict, extreme regulations to protect clients and the whole industry. According to Gaviyau & Sibindi (2023), in the post-global financial crisis of 2008, countries like the UK, the US, and China's customer due diligence notably increased to prevent money laundering and combat the financing of terrorism. Deregulation of the FinTech market, excessive FinTech lending, and insufficient supervisory mechanisms contribute to unchecked disruptive growth in the financial system. This same pattern also existed during the 2008 financial crisis. The incremental progress of Regulatory Technology, or RegTech, has yet to evolve enough to bring any substantial structural changes to the FinTech ecosystem.

No company can fight and diminish financial cybercrime and corruption; there will always be loopholes. Degerli (2019) reported that a well-designed regulation policy strengthened protection against data leaks, identity theft, and system integrity. It also helped banks with their AML compliance. Regulations should be integrated into the FinTech adaptation process such that investments should be divided equally between implementing modern technologies and security concerns.

3.4 Encouraging Sustainability

The FinTech industry has been evolving as a growing force for incorporating social and environmental concerns into its business model. Bhattacharjee et al. (2022) stated that FinTech itself is green because it promotes the use of fewer resources, leading to cost minimization and more efficiency, thereby supporting sustainable development. Green FinTech and sustainable investing are just a few examples that illustrate the contribution of FinTech to combating the escalating climate crisis.

Chueca & Ferruz (2021) and Saha et al.(2024) found that FinTech and sustainable finance share common features, and by adopting green finance, FinTech promotes sustainable business models for the banking industry. The sustainable outcomes of FinTech have alleviated expectations among investors, customers, and other stakeholders that FinTech companies better serve ESG, the energy crisis, and other sustainability issues than their traditional counterparts. In their studies, Bayram & Feridun (2022) showed that by utilizing crowd funding platforms, the Turkish economy had created opportunities for start-ups to raise capital for renewable energy and agricultural technology, enhancing sustainable development.

FinTech has significantly changed nearly every phase of financial services, and FinTech-based financial instruments are gradually becoming essential in the world financial system.

FinTech innovations are gradually focusing on unique value propositions by developing customized financial instruments and challenging the status quo of traditional financial behaviors. On the contrary, the demand for the practical implications of regulation and supervision has far-reaching benefits for the FinTech revolution by striking the right balance between innovation and market participants.

4. Current Practices in FinTech

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4.1 Investment Trend

The total global FinTech investment in 2021 was \$238.9 billion, which climbed to a record high, followed by a fall of \$164.1 billion in 2022. However, the optimism in the FinTech market in 2021 transformed into concerns in 2022. Fed interest rate hikes, supply chain breakdown, The Russia-Ukraine conflict, and the rise in inflation can be considered as the reasons behind this change (KPMG, 2022). Considering the FinTech market situation in 2022, some of the key trends can be identified:

- The surge in investment in RegTech, as companies take advantage of the technologies to manage their increasingly intricate regulatory compliance obligations.
- Freezecryptocurrency investment as more challenges is anticipated on this horizon.
- Partnerships between FinTech and financial institutions, including banks, wealth management firms, and insurance companies, are strengthening.
- ESG-related investments will likely be an area of long-term fintech investment opportunities

Despite the vast upside potential in FinTech, investors need to be well prepared for the systemic fragility of FinTech investment. Agarwal et al. (2019) concluded that illegal transactions through FinTech have created more challenges worldwide as these platforms were operated from China and worldwide. Investment practice should balance out among borrowing, investment, and consumption. Otherwise, it can hurt households with low financial knowledge. Hornuf & Schwienbacher (2017) found that retail investors often face a disadvantage compared to institutional investors when it comes to investing in innovative products, particularly if those products were developed overseas.

4.2 Regulatory Practices

Currently, regulators worldwide are becoming more concerned about these risks and responding with some first-hand regulations. Zetsche et al. (2017) and AIS (2018) showed that FinTech

poses a regulatory challenge, and existing regulatory frameworks may need to be revised with the entrance of new technologies. These challenges include protecting the consumer and investors against technological risks such as data privacy, cyber-attacks, money laundering, and operational and risk governance. To encounter regulatory vulnerabilities due to the growing use of FinTech, authorities in several jurisdictions have initiated regulations like regulatory sandboxes, innovation hubs, and accelerators for facilitating innovation while ensuring moderate risk. In 2018, The World Bank and the International Monetary Fund (IMF) proposed the Bali Fintech Agenda paper, which launched a framework consisting of 12 policies on high-level fintech concerns that countries should address in creating their fintech-related national policies (World Bank, 2020). Hornuf & Schwienbacher (2017) pointed out that regulators in developed economies such as the US and Europe have passed and promoted new regulations. As part of the regulatory framework, the US has set up several innovation hubs: the Office of the Comptroller of the Currency's Office of Innovation, the Consumer Financial Protection Bureau's Project Catalyst, and the Commodity Futures Trading Commission Lab (CFTC) to provide support and guidance to FinTech companies as they navigate the complex regulatory landscape.

From a developing country's perspective, China also took some recent initiatives on FinTech regulation. Navaratri (2018) noted that in China, The Guiding Opinions published in July 2013 by the People's Bank of China and nine other ministers stipulate that the regulation and supervision of FinTech credit must adhere to the supervision principles of "legitimate, appropriate, classified, collaborative, and innovative." Claessens et al. (2018) documented Mexico and Brazil started licensing practices and commenced some new regulations in 2018. According to those recent regulations, for getting the licenses to work in the FinTech-based credit platforms, the person or the institution is subject to proper governance and efficient risk management.

Treleven (2015) advised the regulatory sandbox to be a "safe space," a controlled regulatory environment for testing new products and services. Over 50 countries around the world implemented these regulatory sandboxes. In the UK, the introduction of regulatory sandboxes increased the capital and survival rate of entering companies (Cornelli et al., 2023).

Recently, the Financial Stability Board (FSB) has given a letter to the central bank governors and Finance ministers of G20 countries to take lessons from the turmoil of the banking sector in March 2023 (IMF, 2023). They also urged the efficiency of digitalization and cross-border payments. In addition, the Securities and Futures Commission (SFC), Hongkong has initiated the licensing requirement for trading in virtual asset trading platforms (VATPs) in Hong Kong from June 2024. Consequently, the activity of VATPs without a license will be considered a criminal offense, and they cannot do their business in Hong Kong (SFC, 2024).

4.3 Technologies Behind FinTech

The foundational technology behind FinTech applications is the complex use of artificial intelligence-driven decision-making. Emerging areas of this field that have gained the most popularity recently, such as blockchain, P2P lending, crypto currencies, and crowd funding, are explained below with theoretical and empirical applications.

Blockchain: Blockchain technology has multiple applications in economic transactions. According to Goldstein et al. (2019), the use of Blockchain ranges from fundraising and money transfer to scattered computing and digitalization of assets. Adoption of the Blockchain can ensure consumer welfare through intensifying competition and facilitates credit information systems and payment clearing.

P2P lending: In P2P lending, a primary credit analysis for the applied borrowers is done through the P2P platform without any financial intermediaries, and "loan grade" is assigned based on the risk classification. Milne & Parboteeah (2016) reported that P2P lending became popular in Europe and the US after the financial crisis. However, P2P lending has drawbacks. The risky borrowers can get loans through P2P lending, which traditional lending institutions would otherwise deny. P2P lending is usually preferred by subprime borrowers, while commercial banks compete for prime borrowers.

Crypto currencies: Digital currency, known as "crypto currencies," is becoming a popular potential alternative to fiat money. In addition to serving as money, these digital currencies work as a financial system grounded on a cryptography-based digital public ledger, Blockchain. A decentralized form of control is ensured in this system with security and verification, which is replacing the necessity of any trusted financial mediator like banks.

Crowd-funding: Crowd funding allows individuals and businesses to raise funds for their early-stage projects directly from many people through online platforms. This is a potential alternative to traditional equity investments like holding shares of the listed companies in the stock market. Calic & Mosakowski (2016) found that social entrepreneurs have lower access to traditional sources of financing than commercial entrepreneurs. Though this new form of equity financing can generate greater returns than traditional equity financing, it is arguably riskier.

In addition, digital platforms like Robo-advisors use sophisticated algorithms to provide personalized investment advice to clients and are increasingly popular as an alternative to traditional financial advisors. InsurTech is also catching the race by gathering personal information from connected devices and analyzing data for initial policy pricing to encourage low-risk behaviors. These technologies have fostered financial innovation, increased competition, and driven the emergence of new financial services and business models. However, it is essential to note that with these advancements come regulatory challenges and potential risks related to security, privacy, and fraud.

4.4 Drivers of FinTech Emergence

The COVID-19 pandemic has enhanced the trend towards digitalization of financial services. EY (2017) noted that because of convenience and availability, the adoption of digital financial services increased substantially in advanced and developing economies. From the recent empirical findings, Claessens (2018) & Cornelli (2023) discussed the country's income, banking sector regulation, judicial system efficiency, the size of the labor force, venture capital availability, technological infrastructure, consumer demand, access to funding, and collaboration with traditional financial institutions can be considered as the key drivers of the development of FinTech in a particular country.

The socio-economic condition of a country serves as one of the prime determinants of FinTech evolution and progress. Cornelli et al. (2023) addressed that FinTech-based lending is more prominent in countries with greater per capita GDP based on analyzing 79 countries. Claessens et al. (2018) studied 63 companies from the United States, the United Kingdom, and China and found that GDP per capita positively correlates with an economy's FinTech credit volume per capita.

For the development of FinTech companies, a favorable technological infrastructure that ensures the affluent availability of software, hardware, and uninterrupted flow of communication is necessary. Cutting-edge technologies, particularly in areas such as cloud computing and generative AI, are more in financially developed countries. As a result of this technological advancement, the development of new financial products and services is more efficient, affordable, and convenient in those countries. Stulz (2019) finds that the "Big techs," whose fundamental business is technology, have recently come into credit markets directly or in collaboration with financial institutions. These technology-based credit models offer a decentralized platform to both the lenders and borrowers. Large-scale micro-level information regarding the borrower is available in this system, which mitigates information asymmetry, thus helping reduce loan risks and defaults.

Evolving regulatory landscapes continuously pave the way for FinTech innovation by introducing frameworks that support new financial technologies. Recent initiatives like regulatory sandboxes and open banking initiatives can encourage experimentation while ensuring consumer protection and financial stability. To be precise, FinTech activities flourished where the intensity of regulation is less, and competition is less severe. According to the panel regression analysis of Cornelli et al. (2023), the banking sector's high mark-ups and less regulatory obligation are positively associated with this FinTech credit lending. The developed security market, advanced judicial system, and strong investor protection support the overall technology-based financial credit.

5. FinTech Policy Implication

Technologically driven financial products have changed the perception of the financial system. However, a sharp contrast exists in adopting a progressive policy to outweigh the risk FinTech brings. This has been an open question for a long time: How should FinTech be operated? Figure 2 portrays the urgency of policy adoption from stakeholders' (people/organization) perspective on different FinTech applications. We have discussed FinTech policy from technological, regulatory, monetary, prudent, and sustainable perspectives.

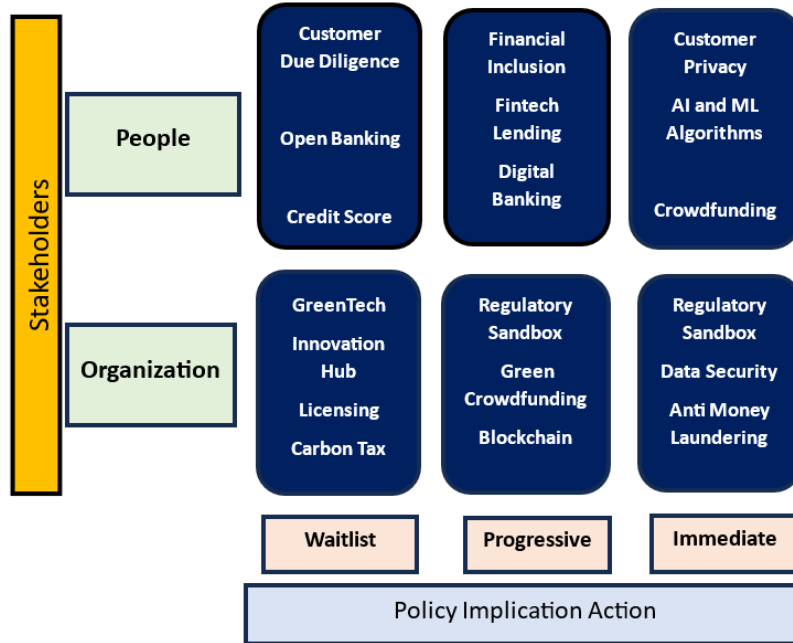


Figure 2: Policy Implication Action from Stakeholders Perspective
 Source: Authors' Analysis

5.1 Technological Policy

In the past decade of financial services, FinTech has observed significant technological changes by contributing innovations such as the development of artificial intelligence (AI) and machine learning and easy access to digital platforms. In this context, policymakers must provide well-defined guidance for mitigating potential risks and maximizing the FinTech industry's benefits. A first-order concern of technological policy is to ensure cyber security in the FinTech industry. Crosignani et al. (2020) considered FinTech spillover the primary cause of cyberattacks. Technological advances in recent years have taken all customers onto digital platforms, which increases the possibility of cyberattacks. Considering cyber security as a growing global challenge, policymakers have addressed several regulatory initiatives, including national regulations, practice guidelines, supervisory regulations, and security frameworks. In addition, since algorithms fail to predict actual market scenarios or cannot execute unfamiliar data effectively, many shareholders related to the market face significant losses. Robert Bartlett et al. (2019) noted that artificial intelligence can sometimes adversely affect a protected group and deprive them of their rights. Policymakers should set guidance and a regulatory framework to protect the FinTech industry from these potential threats. They should establish standards that protect individuals and businesses from cyber risk while allowing them to exercise their potential benefits. Failure to control unauthorized users and system disturbances must be solved by using a

technical specialization in cloud service providers, changing operating software, successfully monitoring user activities, and implementing IT software.

5.2 Regulatory Policy

How does regulation balance both risks and benefits in the FinTech industry? Jayoung et al. (2020) stated that as the growth of the FinTech industry is a hot topic worldwide, regulation of FinTech is necessary for stability, integrity, and customer protection in the market. However, heavy regulations limit innovation, make it impossible to provide customer satisfaction, and prevent companies from advancing in a competitive market. New regulatory tools should welcome innovative ideas and reflect global ethical standards. Neutrality is considered an important principle, which states that given the same risk, regulation does not favor one entity over another.

One crucial regulatory tool is the "regulatory sandbox," a learn-and-test activity used to determine whether markets will positively affect customer satisfaction or market sustainability outside the scope of regulations. Allen (2019) found that as the market responded successfully to the new product, the regulatory sandbox concept spread to many countries. Governments should provide regulatory guidelines in a win-win approach so the new FinTech industry can reduce its legal and institutional risks by adopting a flexible business model. Many developed countries have already introduced regulatory sandboxes in the FinTech industry, including Australia, Singapore, the United Kingdom, Hong Kong. However, regulators from developing and emerging countries need to fasten up monitoring, compliance, and risk reporting mechanisms to collaborate with the global regulatory sandbox standards.

RegTech is a regulatory tool that facilitates the FinTech industry by offering technological innovation, particularly information technology, that regulates the FinTech industry more effectively and efficiently for reporting, monitoring, and compliance. Yang & Li (2018) suggested that FinTech firms and other intermediaries adopt RegTech to improve data monitoring systems, handle associate risk, and protect customers' interests by addressing the view that the traditional regulatory model was ineffective. Regulations should pay close attention to stop FinTech from taking technological advantages and discourage the practice of the shadow banking system by offering services conveniently and quickly without being subject to traditional banking regulation. The pressure on regulators to shift their focus from policing human behavior to regulating and overseeing algorithmic/electronic processes has increased due to the growing use of technology in finance.

5.3 Monetary Policy for FinTech

The development of FinTech or FinTech innovation widely depends on how the economy reacts to monetary policy and how the central bank structures its policy development based on actual market scenarios. Inflation, GDP, Foreign investment, interest rates, and the stock market are essential for policymakers to implement effective monetary policy; thus, these factors could potentially affect FinTech innovation. Ahammed & Saha (2019) stated that FinTech innovation drives the finance industry toward shadow banking or peer-to-peer lending, focusing on market stability and monetary policy transmission from the perspective of FinTech innovation. Curran (2016) addressed that the monetary policy implications are essential for the stability and

continuous growth of the FinTech business. Central bankers must closely examine how the FinTech sector impacts the effective implementation of monetary policy and modify their framework as necessary.

Mishra & Pradhan (2008) found that FinTech disseminates information widely that influences market prices. Therefore, it affects monetary policy decisions. Policymakers should regularly check and balance the FinTech industry's growth since the unprecedented rise of FinTech businesses increases competition in the financial markets. It causes the market to react to changes in interest rates more quickly; central bank decisions on monetary policy influence FinTech firms' financing expenses and capital costs. Kerstin et al. (2017) found that FinTech advancements connected with several virtual currencies such as bitcoin, ripple, crypto currency, and other digital assets significantly affect monetary policy transmission. Thus, policymakers need to design monetary policy within a regulatory environment. Customer protection policies, data privacy, and risk management procedures can indirectly shape the monetary policy of FinTech. An effective monetary policy reduces the risk associated with FinTech activities and ensures financial stability in the FinTech industry.

5.4 Prudential policy:

An essential objective of FinTech is to maintain market stability and safeguard the system from illegal and fraudulent activities. Anti-money laundering (ALM) policy provides some legislative requirements to prevent income generation from unlawful actions or conceal the truth of income generation. According to Allen et al. (2020), Financial Action Task Force (FATF) mandated that all potential FinTech industry customers must review the fundamental requirement under KYC (know your customer) to avoid money laundering. Although ALM regulations vary in different jurisdictions, FinTech must adhere to the licensing and registration requirements based on their operating jurisdiction. Digital platforms and diversified financial services give the advantage of raising natural monopolies in the FinTech industry. So, FinTech needs a competition policy to make a balanced platform and access outsiders to enter the market. Recently, Germany's national regulation provided an example of a new policy for increasing market competition and avoiding monopolism. Under this legislation, Apple should allow third-party payment providers to help them compete with Apply Pay services in their near-field communication. Data protection policy is another critical consideration for the FinTech industry. The increase in customer data on a large scale requires the government to set standards for data collection, storage, and use. An international data standard is also needed to protect data security when jurisdictions use data to benefit from cross-border data. Relying on soft information provides risk in business and needs continuous monitoring for customer protection; thus, FinTech needs a customer protection policy. According to Navaretti et. Al (2017), FinTech Firms exploit better matches to meet the customer's demand using their digital management information system. Addressing customers right through proper digital policy will discourage many fraudulent services and help customers not accept any low-cost solutions through online transactions.

5.5 Sustainable Policy

The recent scenario of the FinTech industry raises a question about the impact of the FinTech sector, whether the FinTech is sustainable, or to what extent sustainability provides worth to the

FinTech sector. Mosteanu & Faccia (2020) and Bhattacharjee et al. (2023) noted that the government should develop business-friendly policies so FinTech may encourage investors to direct investment toward more sustainable assets and assist businesses in evaluating and reducing their environmental impact. FinTech firms should get additional benefits such as favorable tax brackets and government recognition if they participate in developing green finance by lowering the risk of financial lending, raising the degree of regulation, and improving information exchange systems. Arner et al. (2015) emphasized FinTech policy and regulations for allocating financial resources globally to maintain sustainable development goals. Policymakers can leverage the stability of FinTech markets to promote developing sustainable financing products. The government might create a public-private partnership program to support FinTech-based low-carbon technologies focusing on environmentally conscious investment. Policymakers and regulators need to lead an active role in financial education to understand people the benefits of using financial products and services through digital platforms.

6. Concluding Remarks, Policy Implication, Limitations, and Future Research

Although FinTech innovation primarily focuses on overcoming the barriers to traditional banking activities by channeling financial services digitally and efficiently, it has gone beyond the innovation ecosystem of banking economics. In this article, we intend to draw the attention of FinTech from a mere innovation in finance to introducing interdisciplinary optics of FinTech, highlighting FinTech applications for diversified stakeholders across responsible AI, digital transformations, sustainability concerns, and regulatory dynamics within and beyond borders. It is exciting to think about the possibilities of adopting innovative financial inclusion strategies that this could bring to individuals and communities worldwide. As the pathway of digital financing solutions looks more complex and is still emerging, FinTech needs to adapt the existing open banking solutions with unique value propositions aligned with regional market structures. FinTech can promote the strategic partnership between investors, environmentalists, and creditors and leverage non-financial information such as social, environmental, and ecological contexts in the decision-making process to promote sustainable financing opportunities for renewable energy and green technology. FinTech has the competitive advantage over traditional financial institutions to bring remarkable changes to ESG, thanks to cutting-edge tools such as crowdfunding, big data analytics, blockchain technology, and artificial intelligence.

The widespread adoption largely depends on the return exceeding the potential risk and identifying and monitoring those risks that can arise from excessive leverage, liquidity mismatch, regulatory arbitrage, IT vulnerability, conflict of interest, unmatched competition, shadow banking, data security, etc. Firms and companies should be proactive and develop a safety net not only to mitigate these risks but also to tune the regulation between over-regulated and under-regulated, which promotes an innovation environment, considers public interest, and allows continuous dialogue between financial intermediaries, both nationally and internationally. Regulators must set up concrete FinTech guidelines for developing countries to ensure a level playing field and a dynamic regulatory framework to test the efficiency of machine learning and algorithm models in developed countries.

This study has a few limitations. We excluded some studies that can enlighten our perspective on the very early development of FinTech and how FinTech has brought technological orientation to

the finance ecosystem. This study has little to offer the complex FinTech model and structures since FinTech is highly adaptive and has yet to evolve to follow any generalized perspective. Moreover, most of the papers concentrated on discussing any insight into FinTech; this paper has stretched out into different disciplines of FinTech. Since our study is very much narrative, we neither explored any econometric analysis nor validated any existing hypothesis.

Finally, we point out a few research areas that policymakers, regulators, academicians, or professional managers can shed light on in the future that might change the course of action for FinTech. Given the fierce competition in FinTech and infinite opportunities coming, would FinTech emerge as a strategic collaboration, or can it extend its wings to the shadow banking system? From a regulation perspective, would there be any informative and stricter monetary policy for FinTech operation as it has for traditional banking, or should financial regulation develop any other alternative approach to making FinTech more arm-length digital version of a traditional bank? It is also interesting to see whether regulators can prioritize customer privacy and consumer protection over allowing less flexibility and more regulation in FinTech.

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