The Impact of Fintech Adoption on Financial Development: A Systematic Literature Review

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Abstract

The impact of Fintech adoption is multifaceted and continuously transforming. As Fintech initiatives remain in their early stages, and the financial sector has not yet experienced a radical transformation, there is a need to assess its true impact on the financial sector in advance. This review paper meticulously examined how Fintech adoption is revolutionizing financial sector development, particularly in the domains of access, depth, efficiency, and stability. Due to the evolving nature of this phenomenon, our analysis draws insights from the most recent three years of literature on Fintech adoption and its impact on financial sector development. Utilizing the ROSES methodology, the study has conducted a comprehensive systematic literature review. The research question was formulated using the Population, Intervention, Context and Outcome framework. The research findings present a mixed picture, with all domains exhibiting both significant benefits and challenges, leaving this area still ambiguous, primarily due to the lack of a unified measurement strategy used by previous studies, as well as data and measurement constraints. The study contributes by formulating an index for Fintech adoption and financial development, considering its multidimensional nature and drawing on previous studies to reach a consensus measure. The study also identifies the gaps in the existing literature, paving the way for future research avenues.

Keywords: Financial development, Fintech adoption, financial institution & market, digital disruption, SLR

Paper type: Review paper

Introduction

The emergence of financial technology, commonly referred to as Fintech, has fundamentally reshaped the global financial landscape by incorporating a variety of innovative technologies, such as blockchain, machine learning, artificial intelligence, and digital payment systems. These advancements have automated complex financial processes, bolstered security and transparency, and also expedited credit decisions, enabling near-instant results and unprecedented advancements in efficiency, accessibility, and innovation. (Sowmya & Sathisha, 2023; Diéguez et al., 2023). Additionally, Fintech holds immense potential as a pathway of bringing the unbanked and underserved populations into the formal financial ecosystem (Aracil, Jung, & Melguizo, 2025).

As per the Global Fintech Adoption Index (2019), approximately 64 percent of

customers make use of at least one or the other Fintech service and more than 73 percent of the financial interactions is now happening through these solutions (Hassan et al., 2024). The following statistics highlights the global tendencies of consumers' acceptance and usage of Fintech services which depicts Fintech as a potential source of disruptive innovation to financial world (Kovacheva, 2024).

There is no doubt that Fintech has introduced the numerous advantages, but it has also presented significant challenges. One of the major challenges that bring about by Fintech solutions is their decentralized structure: a challenge that is difficult to manage by regulators who accustomed to overseeing centralized traditional financial systems (Chatterjee et al, 2023). This situation not only creates uncertainties but it also results in risks to financial stability. Additionally, the heightened reliance on Fintech platforms has heightened the threat of cyberattacks, thereby posing high risk to both financial institution and their customers (AlBenJasim et al., 2024). In addition, the competition that is induced by Fintech weakens market power, decreases overall profitability and reduces the value of conventional financial institution. Consequently, the traditional financial institution witnesses greater motivation to engage in excessive risk-taking (Elekdağ et al., 2024). Lastly, the risk of exacerbating existing inequalities through disparities in access to financial technologies cannot be overlooked, as it may further marginalize vulnerable populations (Akinbowale et al., 2023).

The issue is, however, in comprehending complex and multifaceted effects of Fintech implementation, including the positive advancements and negative threats it presents to the financial system. This becomes increasingly important as traditional financial sectors across the globe are adapting new model changes to deal with such technology disruptions affecting, not only the developed economy but potentially transformative for the emerging markets where Fintech is said to bring financial inclusion for larger communities (Sampat, Carruthers, & Sandeen, 2024; Meyer & Okoli, 2023). All these dynamics have to be managed and addressed by policymakers, financial institutions and investors in order to foster the full potential of the Fintech adoption for sustainability of financial sectors.

While prior research has started exploring different domain of Fintech, a theoretical gap has occurred in analyzing the effects of Fintech on financial sector growth. The studies in this line of research are still limited and preliminary, and there is a severe lack of a well-structured Fintech literature available currently (Choudhary and Thenmozhi, 2024; Liu, Chan and Chimhundu, 2024; Jourdan et al, 2023). Notably,

in-depth studies exploring how Fintech adoption influences crucial dimensions of financial sector development, such as access, depth, efficiency, and stability, are limited. Instead, the majority of existing literature focuses on the drivers of digital financial services adoption or the technological facets of Fintech, rather than addressing the profound implication of Fintech adoption on the access, depth, efficiency, and stability of established financial institutions and markets. This critical research gap underscores the pressing need of comprehensive systematic literature review to investigation Fintech adoption's true influence on the overall development i.e. access, depth, efficiency, and stability of the financial sector.

The systematic literature review (SLR) is essential for Fintech and financial sector development studies, which are rapidly evolving and have fragmented research. It summarizes key findings on the impact of Fintech adoption on access, depth, efficiency, and stability of the financial sector, as well as identifies gaps in existing studies that could be addressed in future research. For systematic literature review, the study adhere to standard operating procedure, such as the ROSES guidelines, ensuring a transparency and easy replicability that boosts the research credibility. Based on comprehensive literature review, the research provides a broad perspective, assisting policymakers and financial institutions in understanding Fintech's implications on traditional financial sector for developing actionable strategies.

This research offers novelty by providing a comprehensive and up-to-date analysis of the influence of Fintech adoption on financial sector development. This research not only evaluates the general impact, but also digs deeper into how this technology affects access, depth, efficiency and stability aspects of financial sector. Additionally, this research establishes a universal measuring index for Fintech adoption, drawing on the multiple measures used in previous segregated studies, including innovation, support, and channel dimension at the global level, as well as payment, resource allocation, risk management, network channels, big data, AI, distributed technology, and security at the financial institution level. Finally, it offers practical, actionable recommendations for financial sector to adapt and thrive in the face of Fintech disruption. These recommendations can greatly benefit financial sector managers and policymakers in developing policies and strategies that enable them to stay competitive amid the rapid transformations reshaping the financial industry.

The remaining section is organized as follows. Section 2 examines the relationship between Fintech adoption and financial development, defining these concepts and

exploring their current status. Section 3 outlines the systematic approach and criteria used to select the articles reviewed. Section 4 presents the findings in a table summary of 51 research paper. Section 5 discuss the key findings from the reviewed studies, provide future direction and contribution. Lastly, Section 6 concludes the study by highlighting the policy implication and recommendations and provide the limitation of study.

Definitions and Current Status of Key Concepts

Fintech adoption

The term "Fintech" has a long-standing history, spanning nearly three decades, yet its interpretation continues to be multifaceted and diverse. This is largely attributable to the wide-ranging applications and perspectives encompassed by the Fintech domain, as well as its rapid and ongoing evolution (Treu, 2022). As a result, there is a pressing need to establish a clear and definitive understanding within this dynamic field. Drawing upon recent insights, Table 2.1 below presents various perspectives and explanations that extend beyond the etymological definition of the Fintech concept.

Table 1. Overview of Fintech Definitions

Overview of Various Fintech Definitions	Author(s)
Applying advanced technology to enhance financial activities that may not be otherwise accessible to certain economic entities.	Muhtar et al. (2024)
Fintech encompasses a broad range of cutting-edge technologies and business models, including robo-advisors, peer-to-peer lending, crowdfunding blockchain technology, cryptocurrencies and electronic payment channels which foster innovation and entrepreneurship in a variety of industries.	Harsono and Suprapti, (2024)
Fintech is the fusion of digital technology in the financial services industry, which is radically changing how traditional financial institutions operate.	Liu et al., (2024),
Financial technology (Fintech) revolutionizes the financial industry by incorporating technology into financial services.	Cevik, (2024)
Fintech encompasses a fresh range of tailored products aimed at addressing the requirements of small enterprises. These encompass peer-to-peer lending, financial services for merchants and e-commerce, invoice financing, online supply chain financing,	World Economic Forum, (2024)

and digital trade finance.

<div align="center">OR</div>

Defined as the application of cutting-edge business strategies and technology in the financial services industry.	
Fintech refers to technological innovations in financial services that have the potential to introduce new business models, applications, processes, or products with a significant impact on the delivery of financial services. These activities can be classified into five main categories: (i) payments, clearing, and settlement; (ii) deposits, lending, and capital raising; (iii) insurance; (iv) investment management; and (v) market support.	Financial Stability Board, (2022)
The BCBS has chosen to adopt the working definition of Fintech from the Financial Stability Board… Besides the FSB definition, the BCBS also employed a classification of Fintech that includes (i) credit, deposit, and capital-raising services, (ii) payments, clearing and settlement services, and (iii) investment management service.	Basel Committee on Banking Supervision (2018)
Fintech is the term used to describe technology developments that have the potential to completely transform the way financial services are provided, giving rise to new business models, apps, processes, and products.	IMF, (2018)
A technological advancement that has potential to upend long-standing financial paradigms, increase financial services' delivery, accessibility, and consumption resulting in increased efficiency, inclusivity, and accessibility.	Choudhary and Thenmozhi., (2024)

Source: Created by the author based on mentioned investigator (s)

Based on the definitions provided in Table 2.1, the study identifies the opportunity to conceptualize Fintech as: "Fintech encompasses the innovative integration of technology within the financial sector, spanning a diverse array of digital tools, business models, and applications that seek to enhance, automate, or revolutionize conventional financial operations, as well as generate novel financial products and services."

The State of Fintech Adoption

Fintech has resulted in substantial disruption within the financial services industry

over the past several years (Choudhary and Thenmozhi, 2024). Its widespread adoption occurred in the wake of the 2008 global financial crisis, as individuals' confidence in such technological innovations increased dramatically, driving significant customer growth within this sector at an exceptional average rate exceeding 50% (Almaqtari., 2024). This remarkable transformation stems from advancements in technology, shifts in consumer behavior, regulatory changes, and evolving market demands (World Economic Forum, 2024). The ADO framework cites government support, disruptive technology, transparency, speed, cost-effectiveness, and bank-Fintech collaborations as the antecedents driving Fintech expansion (Choudhary and Thenmozhi., 2024).

The Fintech phenomenon has brought about a range of beneficial outcomes, as stated by Treu (2024). These include: (i) The reduction of market frictions and information asymmetries, which helps to avoid agency conflicts and promotes financial inclusion. (ii) The strengthening of global financial stability by improving the decentralization and diversification of the financial system. (iii) Enhanced efficiency through better diversification of investment risk, increased competition, and reduced reliance on geographical proximity to financial services or products. (iv) Lower company-specific costs, including fixed and marginal costs associated with providing financial services. (v) Greater convenience for users and reduced transaction costs. (vi) Improved access to credit for excluded groups, particularly for those without collateral or credit history. (vii) Reducing reliance on collateral as a measure of creditworthiness for granting loans. (viii) Increased transparency and trust between providers and borrowers, enabling direct negotiation between investors and borrowers without the need for intermediaries.

Owing to the anticipated benefits of Fintech adoption, investments in Fintech enterprises have experienced substantial growth over the past decade, with the global investment value escalating from $9 billion in 2010 to $247.2 billion in 2021. While the momentum slowed in 2020 and investments subsequently declined, some argue that this does not signify a long-term downturn. Despite a dip to $51.9 billion in the first half of 2024, the Fintech industry remains dynamic and innovative, exhibiting promising growth prospects. These cyclical fluctuations are not necessarily a cause for alarm, as Fintech investment continues to be robust, and the industry has weathered economic challenges before. The 2024 decline may be a temporary setback, and the long-term growth trajectory of Fintech remains firmly intact (Fig 1). This

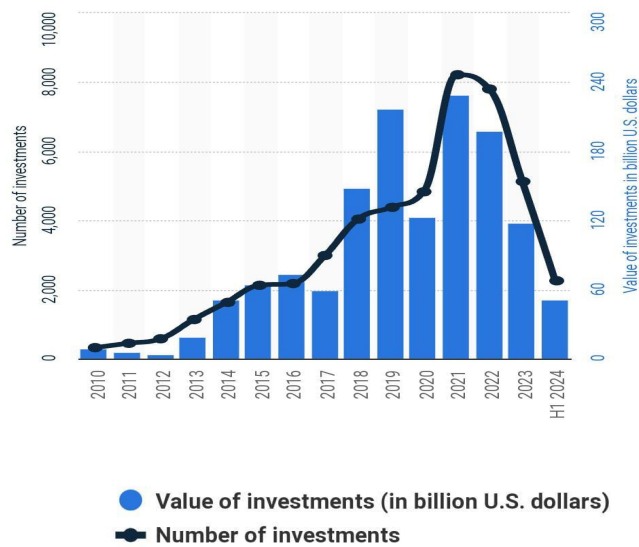trend is reflected in the proliferation of Fintech startups worldwide.

Figure 1. Global Fintech Investment

Source: Statista (2024)

The steady rise of Fintech enterprises across regions further underscores the industry's resilience and growing global impact. As of May 2024, a report by BCG documented a combined total of 13,000 Fintech startups in the Americas, solidifying the region's position as the global leader in Fintech startup activity. In contrast, the EMEA region had 10,969 Fintech startups (up from 3581 in 2018) and the Asia Pacific region had 5886 Fintech startups (an increase from 2864 in 2018) according to recent Statista's report for 2024 (Fig 2). The exponential growth observed here is indicative of the growing impact and use of Fintech solutions in financial sector across the world.
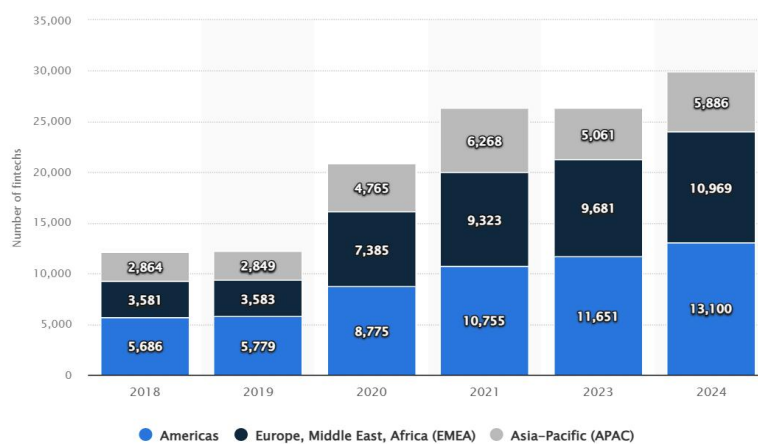
Number of Fintech Start-ups

Figure 2. Fintech Trend across the World

Source: KPMG, Statista

The traditional financial industry is seeing increased rivalry due to emerging technologies, which is forcing institutions to increase their performance in order to keep a competitive edge (Murinde et al. 2022). Additionally, Fintech's increasing technological complexity and exposure to cybersecurity threats present potential systemic risks that can amplify market volatility, encourage risk-taking behavior among consumers and financial institutions, and undermine overall financial development. Policymakers must proactively evaluate Fintech in order to leverage its benefits while addressing the associated risks for sustained economic growth within the financial sector.

Financial Development

The financial development has been acknowledged as a crucial factor to the economic growth of a country (Kandpal et al., 2024). The nation's economic architecture is strengthened by an effective financial system, which supports effective money allocation, management, and financial investment (Isayas 2022). Since financial development has a favorable impact on general economic development, financial sector should assess their development in order to promote economic growth. Among the five most important functions of a financial system are the following: (i) generating information on investments and capital allocation, (ii) facilitating the exchange of goods and services, (iii) mobilizing and pooling savings, (iv) facilitating trading and risk management, and (v) monitoring investments and corporate governance.

The 2008 global financial crisis and declining interest rates have severely hindered financial progress. Yet, to uphold sustainability and deliver returns for investors, the financial sector must undergo development. In addition, according to the Global Findex database (2021), approximately 1.4 billion individuals lack access to the formal financial system. Alarmingly, 680,000 of those with access fail to utilize it effectively. In addition, approximately more than half of the unbanked individuals are located in the developing countries, highlighting the divide in financial inclusion across regions.

These statistics underscore the urgent need for targeted interventions to address financial exclusion and enhance the effectiveness and stability of financial services. That is why the financial industry needs to focus on its further development to make a significant impact on the economy (Tarawneh et al., 2024; Klein and Weill 2022). Relative to this, this review presents a brief and informative assessment on

potential impact of Fintech adoption towards driving financial development.

Methodology

Following the study Jafri et al., (2024), this present review employs Reporting standards for systematic evidence syntheses (ROSES). Using ROSES offers numerous advantages. It is a widely accepted standard that boosts the review's rigorousness and credibility, enhances the transparency and methodological consistency in the research process, promoting validity and reliability of findings to facilitate global comparisons with other reviews and is accepted world over. There is also no bias in this framework as it fits any type of data for enhanced analysis and handling at the same time. It provides the evidence base for subsequent investigation and highlights research gaps for further study (Manaf et al., 2023). The SLA process flow is illustrated in Fig 3.

SLA process flow

Figure 3. Systematic Literature Analysis (SLA) Process Flow

Source: Author

Formulating the Research Question

Based on the targeted review topic, the study has adopted the PICO (Population, Intervention, Context and Outcome) framework (Table 2) to formulate two research questions.

RQ1: What is the overall impact of Fintech adoption on financial sector development, considering the dimensions of access, depth, efficiency, and stability?

RQ2: What are the key gaps in existing research on the relationship between Fintech and financial sector development, and what future research directions are suggested?

Table 2:   Aspects based on PICO Concept

Concept	Aspect
Population	Countries, regions, or sectors experiencing Fintech adoption

Intervention	Adoption of Fintech technologies (e.g., digital payments, lending, blockchain, mobile phone diffusion, fixed broad band)
Context	Financial systems in various stages of development (e.g., developed and emerging economies, global markets)
Outcome	Financial development in terms of *access*, *depth*, *efficiency*, and *stability*

Source: Author

Developing Search Strategies

Identification

To conduct a systematic literature review, the researchers accessed prominent academic databases, including ScienceDirect and Google Scholar, to gather relevant latest literature published between 2022 and 2024. These databases were selected due to their strength and prominence in the emerging finance, economic and technology research domain. ScienceDirect offers high-quality, peer-reviewed articles from Elsevier, while Google Scholar includes a range of sources, with free access and citation metrics. Together, these platforms facilitate efficient literature gathering, ensure replicability, avoid duplications, and enable reliable quality appraisal.

The study period is constrained to 2022 to 2024 due to the rapid evolution of technology and financial systems. By focusing on the most recent research, the study can ensure that findings accurately reflect the current trends, innovations, and challenges within the Fintech domain and its influence on financial development. The search terms used were informed by the purpose and scope of the study (Table 3).
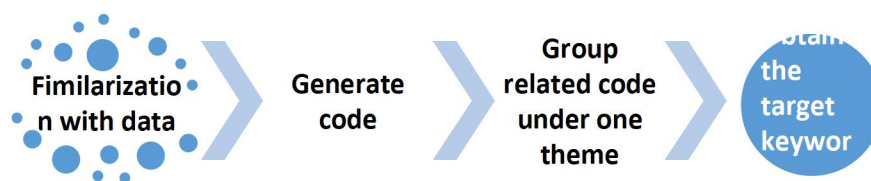
Targeted Keywords

Figure 4. Keywords Process Flow

Source: Author

Table 3: Search String Across Selected Databases

Database	Keywords string
Science	'Fintech adoption' OR 'Fintech penetration' AND 'financial

Direct		development'

Source: Author

Screening and Selection

The screening procedure encompasses two phases as follow:

Initial screening: The study applied rigorous inclusion and exclusion criteria to filter the literature. The details of this process are summarized in Table 4.

Table 4:   **Inclusion and Exclusion Criteria**

Criteria	Inclusion	Exclusion
Literature type	Article journals (Empirical data)	Systematic review articles, review articles, chapter in the book, meta-analyses articles, book series conference proceeding.
Access	Open access	No open access
Language	Language English	Non-English
Timeline	>2021	<2022

Source: Author

Final Selection

Title and Abstract Assessment: Irrelevant articles based on the title and abstract will be eliminated.

Full Text Filtration: Articles that progress through the initial stage will undergo comprehensive review to verify their relevance.

Duplication Elimination: Articles appearing in multiple databases will be removed.

The framework outlines a stepwise approach from initial data screening through to final synthesis, as illustrated in Fig 5.
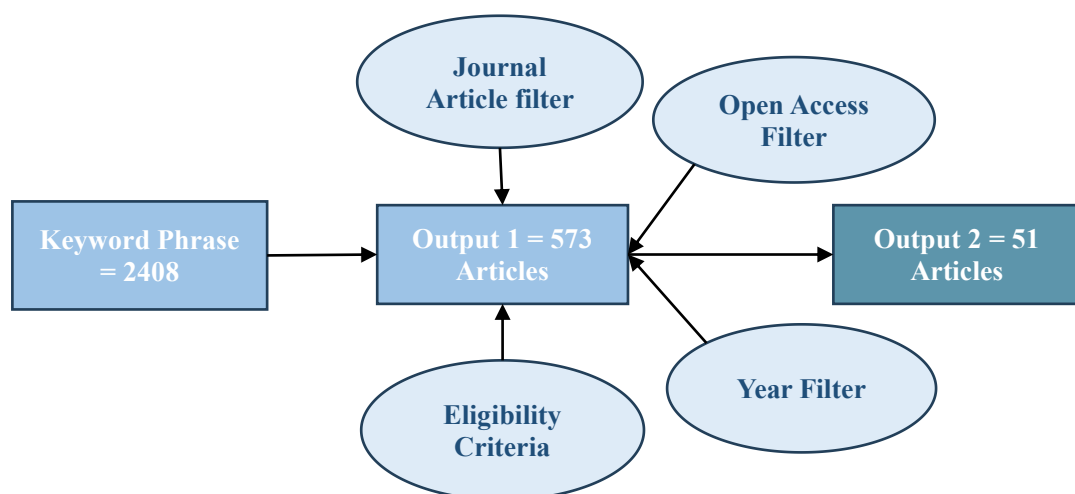

Figure 5. ROSES step-by-step filtration from initial data screening to final synthesis

Source: Author

Results and Synthesis of Key Findings

To address the research questions, a systematic review of 51 selected studies was conducted. Table 5 summarizes the key findings of these studies, providing an overview of the evidence base for this relationship.

Table 5: Synopsis of Fintech-Financial Development Studies

Author(s)	Timeframe	Fintech measures	Sample	Finding
Aracil, Jung, & Melguizo, (2025)	2021	70,000 individual observations on mobile money	70 emerging countries	Mobile money enhances financial inclusion
Gyau et al., (2024)	2010 to 2020	Patent applications granted and ICT development	20 countries	Fintech positively impacts banks profitability (ROA)
Citterio et al. (2024)	2017 to 2022	PCA: digital channel development," "network efficiency," and "IT investments.	EU-27 bank	Digitalization is associated with higher bank profitability
Koranteng & You, (2024)	2013–2020	Crowdfunding, business lending and consumer lending	25 countries	Fintech financing makes a positive contribution towards financial stability
Cevik, (2024)	2012-2022	Digital lending and capital raising	108 countries	Fintech development have negative relationship with financial stability
Ismail et	2004-2021	Mobile phone	7 developing	Fintech adoption

al., (2024)		subscription, and internet usage FI: ATM/100,000 adults, Branches/100,00 0 adults	countries	have significant positive effect on financial inclusion
Miftari et al., (2024)	2011-2021	Digital financial services (Mobile banking, digital payment) IMF 5-year data	11 Balkan countries	Fintech-digital payment and financial inclusion are positively correlated
Kamara, & Yu, (2024)	2004-2021	PCA index: fixed broad band and mobile subscription	22 countries in SSA	Fintech development have detrimental effect on tradition financial access (bank branches and ATMs) and usage (outstanding loan) and overall positive effect on financial inclusion
Khan et al. (2023)	2010-2022.	Index– text mining approach	GCC countries	Fintech adoption has decreased bank stability
Al-Shari & Lokhande, (2023).	Oct-Dec 2021	Questionnaire for 263 bank branches mangers	Yemen	The performance of banks is negatively impacted by fintech
Djoufouet, & Pondie, (2022).	2011-2020	(Global Findex) three-yearly data	35 SSA countries	Fintech adoption positively contributes to financial inclusion

Tran and Huynh, (2022)	2000-2020.	Internet users, financial development; Domestic credit/GDP	Ten ASEAN nations	ICT stimulates financial development
Liao, (2023)	2007-2020	Mobile payment systems and ATMs	Taiwan	Initiatives pertaining to Fintech do not considerably increase bank efficiency
Adel, (2024)	2011-2021	Number of people using or receiving digital payments as a percentage of the population	56 emerging countries	Adoption of Fintech continuously encourages inclusivity in Latin America and Asia
Yoon et al., (2023)	2014, 2017, and 2021	Global Findex Database	91 countries	Fintech significantly increases financial efficiency dimension
Lavrinenko et al., (2023)	2020	Index: The No. of Fintech companies, work environment indicators and achievements	EU nations in 2020	The Fintech index and financial development have a favorable relationship.
Sanga and Aziakpono, (2022)	2010-2019	Composite index: mobile, internet usage, telephone and broadband subscriptions (%)	43 African countries	Fintech had a favorable on financial deepening
Ayaz,	2011-2020.	Mobile phones to	150 countries	Fintech promote

Afeef and Jan, (2023)		pay bill (3-year data)		financial stability
Dhanraj et al., (2024)	2023	Survey with 262 respondents from various financial institutions	financial institutions	Fintech promote effective functioning of financial institution
Kouladoum et al. (2022)	2004-2019	Internet users, fixed broadband and mobile telephone subscriber	43 sub-Saharan African	Financial inclusion is significantly improved by Fintech
Aduba, Asgari, and Izawa (2023)	2010-2020	Mobile phones (digital devices) to pay bills, mobile money account (3-year data)	80 countries	Fintech penetration drives financial development
Elekdag et al., (2024)	2012-2020	Digital lending and capital raising	57 countries	Financial institutions increased risk-taking is linked to the growing use of Fintech
Cuadrosn-Solas et al., (2024)	2013-2019	Fintech lending volumes	International sample of 6,225 banks (79 countries)	The volume of credit extended by Fintech lenders has a negative impact on banks' market power and financial stability
Meyer & Okoli, (2023)	2004 to 2020	PCA: Mobile cellular subscription,	Sixteen African economies	Adoption of Fintech positively impact banks profitability

		fixed broad band and ATM per 100,000 people	
Elouaourti, & Ibourk (2024)	2021	Data sourced from 9,053 individuals (Global Findex 2021 database)	9 MENA countries	Fintech adoption may not be universally beneficial for enhancing financial inclusion
Sajid et al., (2023)	2014-2021	Fintech index: Content analysis	China, India, Pakistan, and Bangladesh	Fintech goods have no direct impact on banks' risk-taking practices
Yudaruddin et al., (2023)	2004-2018	The total Fintech companies, as well as the No. of Fintech platforms for lending and payments	141 banks in Indonesia	Fintech development tend to enhance financial institution stability
Aleemi, Javaid & Hafeez (2023)	2005-2017	The Global Findex database indicators	51 countries	Fintech adoption significantly contributes to greater financial inclusion
Vuković et al., (2024)	2015-2022	The KBW Nasdaq Fintech Index's monthly data	BRICS economies	Fintech development promote financial inclusion but have no significant result for financial stability
Tong and Yang,	2013-2020	Web crawling technology and	33 listed banks China	Fintech contributes to the improvement

(2024)		text mining methods		of commercial banks' profitability
Alghadi, (2024)	2017-2021	Text mining technique: Internet and Mobile banking, crowdfunding, and atm machines	Jordan's Islamic Bank	Fintech adoption have a positive influence on the financial performance
Goswami, Sharma, & Chouhan, (2022)	2022	Survey question: Online lending platforms, digital payments, and mobile banking	Rural India	Fintech adoption significantly contributes to greater financial inclusion
Chouhan et al., (2023)	2022	Structured questionnaire filled out by 300 customers'	300 Indian conventional bank clients	Fintech trigger the financial performance
Muganyi et al., (2022)	2011-2018.	Digital Financial Inclusion Index-China	290 Chinese cities	Fintech has positive impact on financial development (access, depth, stability)
Aloulou et al., (2024)	2023	Questionnaire based indexed	Emirati banking industry	Fintech adoption significant positive effect on UAE banking industry
Wang et al., (2022)	2013-2019	Online payments handled by non-bank payment companies	China's banking sector	Growth of Fintech deteriorate bank performance
Nguyen, (2022)	2010-2020	Number of newly founded Fintech	Emerging country	Fintech development has a

		businesses in a given year	(Vietnam)	detrimental impact on financial stability
Junarsin et al., (2023)	2019-2022	The outstanding loan balance of Fintech lending firms	34 regions in Indonesia	Fintech lending expansion can disturb financial system stability
Uddin et al., (2023)	2008-2017	Banks' spending on digital technology	264 banks from 43 countries	Digital transformation in banks enhance operational risk
Li et al., (2022)	2008-2020	An index that is based on web crawler technology and the annual No. of Fintech innovation news	65 commercial banks in China	Enhancement of the bank's Fintech innovation considerably lowers the amount of risk it takes
Al-Matari, (2022)	2019	Global Fintech Adoption Index	Saudi Arabia	Adoption of Fintech improves the performance of businesses in the financial industry in Saudi Arabia
Wu, Pathan, & Zheng (2024)	2015-Q2 2021	Fintech index based on media sources	top 300 United States banks	Adoption of Fintech and bank liquidity creation are negatively correlated
Tang, (2024)	2011 and 2021	Use factor analyses and strong text mining	101 Chinese banks	Fintech increases bank diversification and decreases the bank liquidity

			procedures
Chao et al., (2024)	2010-2021	The Digital Transformation Index of Peking University Commercial Bank	54 Chinese rural commercial banks	Rural commercial banks can greatly increase their profitability through digital transformation
Curcio et al., (2024)	2011-2021	Daily prices of the Global Fintech Index	US and EU financials industry	Fintech exacerbate systemic risk in financial industry
Wang et al., (2024)	2011-2019	Index: mobile payments, online lending, and internet banking	19 urban agglomerations and 165 cities across China	Digital finance exhibits an inverted U-shaped relationship with financial efficiency
Wu & Wang., (2023)	2011-2019	Internet broadband access per 10,000 people.	285 Chinese cities	A significant positive correlation between ICT infrastructure development and financial development
Phan et al., (2024)	2011-2015	Internet use (household data)	Vietnam and Thailand	Internet use has a statistically significant detrimental effect on loan terms and financial access
Kodongo, (2024)	2019	FIN Access Household Survey for Kenya	Kenya	Fintech can play a significant role in promoting financial inclusion
Shakib et	2004-2020	Number of	77 Russian	Positive

al., (2023)		patents registered per 10,000 people	regions	relationship between innovation and credit market depth
Hoque et al., (2024)	2013-2022	Web crawling technology and text mining methods	26 commercial banks in Vietnam	Digital transformation significantly reduces credit risk

Source: Author's investigation

Fintech Adoption and Financial Accessibility

Fintech significantly reduces transaction costs, making financial services more affordable for low-income populations. Mobile technologies, for example, allow individuals to access services without incurring excessive costs (Aracil, Jung, & Melguizo, 2025; Ismail et al., 2024; Goswami et al., 2022). Additionally, Fintech transcends geographical barriers by leveraging digital platforms, providing services to remote areas where traditional banks are scarce, thus fostering financial participation among underserved populations (Miftari et al., 2024; Kodongo, 2024). Innovations such as microloans and digital savings platforms are tailored to meet the specific needs of marginalized groups, promoting entrepreneurship and economic empowerment (Ismail et al., 2024; Goswami et al., 2022). Many Fintech-platforms also incorporate educational tools that enhance financial literacy and trust in digital services (Kodongo, 2024). Furthermore, the digital nature of Fintech enhances transparency, which can build trust in the financial system and encourage participation from skeptical populations (Goswami et al., 2022). However, in some regions, regulatory oversight inadequate infrastructure and financial literacy hinders the effectiveness of Fintech solutions, resulting in the exploitation of vulnerable populations, digital divide and over-indebtness, reducing the financial sector development (Elouaourti, & Ibourk 2024; Adel, 2024).

Fintech Adoption and Financial Depth

Fintech innovations improve the usage of financial services, leading to increase in the demand for credit and financial institution deposits, which is crucial for deepening financial markets by making more funds available for lending (Sanga & Aziakpono, 2022; Shakib et al., 2023). Fintech also reduces information asymmetry between borrowers and lenders, making lenders more willing to extend credit, which fosters a

more robust credit market by improving the quality and growth potential of businesses (Shakib et al., 2023). The enhanced customer experience through mobile and internet banking also plays a role in attracting new clients, thereby expanding the customer base (Aloulou et al., 2023). Furthermore, Fintech facilitates access to tailored financial products, such as digital savings platforms and microloans, which improve financial inclusion status and also contributes to overall financial sector depth (Sanga & Aziakpono, 2022).

However, Fintech adoption also has the adverse impacts towards the financial depth in terms of intensification of competitive pressures and capital demands on the financial industry. This thus undermines its basic operating area of deposit, lead to tighter credit policies, reducing their liquidity creation capabilities and profitability (Tang et al., 2024). Additionally, Fintech adoption also reduce liquidity creation during financial crises, as financial sector may prioritize risk management over liquidity generation, exacerbating economic uncertainty when liquidity is most needed (Wu et al., 2024).

Fintech Adoption and Financial Efficiency

Fintech adoption significantly enhances financial sector efficiency through various ways. It improves customer service and product innovation by enabling the development of tailored financial products that attract new customers and enhance loyalty, as observed in Chinese listed banks (Li et al., 2022). Furthermore, by offering diverse online services, Fintech enhances banks' competitiveness, leading to higher customer acquisition and retention rates (financial inclusion), opening new market opportunities (Al-Matari et al., 2022; Yoon et al., 2023). Additionally, Fintech fosters operational efficiency and cost reduction by automating processes, reducing reliance on manual labor, and enabling better resource allocation, which boosts productivity and profitability. It also enhances regulatory compliance and risk management through solutions like RegTech, which streamline compliance processes, improve loan performance and reduce default loses (Tong & Wang, 2024). Lastly, advanced security measures integrated through Fintech reduce build customer trust and reduce fraud risks, which is essential for sustaining long-term relationships, while automation optimizes resource utilization, enhancing overall efficiency and productivity (Yoon et al., 2023).

While on the other side, Liao et al., (2023) identify "IT productivity paradox," where the expected efficiency gains from Fintech adoption do not fully materialize, likely

because of high adaptation costs which restrict their financial resources. To this the increase competition from Fintech firms offering similar services not only erodes traditional financial sectors' market share but also their potential revenue. In addition, Fintech firms attract customers without bearing the same regulatory burdens, further reduce financial sectors' profitability (Wang et al., 2024). Moreover, Fintech adoption also introduces several risks cyber risks and operational risks, likely results in system failures, leading to financial losses, interruptions, and regulatory fines (Al-Shari & Lokhande, 2023; Uddin et al., 2023). These factors underscore the complex trade-offs between benefits and challenges financial sector faces in pursuing technological advancements.

Fintech Adoption and Financial Stability

Research indicates that Fintech adoption serves a dual purpose in enhancing financial stability. It contributes positively by broadening the range of services, reducing systemic risks, and boosting market efficiency through innovative and cost-effective solutions that minimize transaction costs and mitigate information asymmetry (Ayaz et al., 2023). Cutting-edge financial innovations such as data analytics and artificial intelligence significantly advance risk assessment and management processes, allowing banks to better identify and address potential risks (Hu, Zhao, & Yang, 2024). Moreover, these technologies facilitate more accurate credit evaluations (Hoque et al., 2024), reinforcing the overall health of financial institutions. Additionally, improved risk pricing and data processing result in superior capital allocation and transparency (Koranteng, & You, 2024), particularly benefiting emerging financial sectors (Yudaruddin et al., 2023).

Fintech adoption, while beneficial, poses several risks to financial stability including cybersecurity threats, data breaches and regulatory challenges which can erode trust and disrupt financial services (Curcio et al., 2024; Nguyen & Dang, 2022). With greater technological complexity and exposure to cybersecurity threats, Fintech also poses significant potential system-wide risks to financial stability and integrity with cascading effect (Cevik, 2024; Curcio et al., 2024). In addition, Fintech platforms may exacerbate information asymmetries, particularly in peer-to-peer lending, leading to mispriced risks and increased defaults (Elekdağ et al., 2024). Moreover, Fintech activities can amplify pro-cyclicality, loosening lending standards during booms and tightening them sharply during downturns, thereby exacerbating economic fluctuations (Cevik, 2024). Finally, the competition pressure may drive

traditional banks to assume excessive risks, relax credit standards, increase non-performing loans, and reduce market power (Junarsin et al., 2023; Cuadrosn-Solas et al., 2024; Khan et al., 2023).

Limitations and Future Research Avenues

Financial development can be viewed as enhancing both the quantity and quality of financial services (Levine, 2012). Existing studies often focus on limited aspects of financial development, failing to provide a comprehensive understanding (Aracil, Jung, & Melguizo, 2025; Wu & Wang.,2023; Aduba, Asgari, and Izawa 2023; Muganyi et al., 2022). Future research should aim to integrate all dimensions of financial development; namely, access, depth, efficiency, and stability into a single study. This comprehensive approach will provide a more accurate representation of financial development. By examining these dimensions together, researchers can better understand Fintech adoption role in enhancing financial systems. This holistic approach will inform policymakers and practitioners, enabling more effective strategies for harnessing Fintech adoption to enhance financial development.

Previous research faces limitations in operationalizing and measuring the dynamic concept of Fintech due to data constraints. For instance, Kamara and Bao-rong (2024) identified limitations in accessing comprehensive Fintech indicators, while Adel (2024) acknowledged the potential for measurement errors in key variables like digital literacy and technology adoption. Likewise, Aleemi et al. (2023) relied on digital financial services as a proxy for Fintech, which may not fully capture its breadth and depth. Similarly, Yoon et al. (2023) utilized a single proxy for Fintech adoption, oversimplifying the multifaceted nature of the phenomenon.

The literature clearly indicates that there is a non-linear relationship between technology and development (Rogers, 1995), however there is a gap in literature exploring this Fintech-financial development complex nexus. Few of current studies focus on linear correlations while excluding possible interaction effects at different levels of Fintech adoption and financial maturity levels. Future research should extend the study of Fintech with non-linear specification and consider dimensions of financial development, in different regulatory and economic contexts (Citterio et al., 2024). Examining thresholds for Fintech's positive or negative influence could provide valuable insights for policymakers and financial institutions. Addressing these gaps can contribute to a more comprehensive understanding of Fintech's impact on financial development and guide effective strategies for the efficient application of

technologies in the sector.

In addition, existing studies often have a limited geographical and contextual focus, restricting the generalizability of their findings ((Tang, 2024; Wang et al., 2024; Junarsin et al. 2023; Aloulou et al. 2023). Future research on cross-national longitudinal studies examining data from multiple jurisdictions can provide more comprehensive insights and enhance the credibility of results detailed statistical techniques (Elekdağ et al., 2024; Aleemi et al., 2023; Hoque, 2024; Chao et al., 2024). To advance the findings concerning Fintech adoption and financial development, future studies can work on comparative studies among developing and developed countries (Phan et al., 2024; Ismail et al., 2023; Ayaz et al., 2023).

Similarly, the current literature has suffered methodological limitations due to data availability, such as challenges in using cross-sectional data to establish causality and issues with econometric methods like endogeneity, simultaneity and omitted variables (Kodongo 2024; Wang et al, 2024). Additionally, prior studies relied on limited IMF survey data, leading to a lack of advanced econometric approaches (Lavrinenko et al., 2023; Aduba, Asgari, and Izawa 2023; Ayaz, Afeef and Jan, 2023). The current study addresses these limitations by introducing a multifaceted Fintech adoption index, aligning with the recognition of Fintech as a complex, diverse phenomenon. The rich data set on proxy identify will enable long-term analyses using more sophisticated econometric techniques.

Most prior studies on Fintech adoption have only targeted certain specific financial segments like the conventional banks and the rural commercial banks. This narrow focus fails to capture the broader financial ecosystem, particularly the role of financial markets, which remains largely unexamined in previous studies (Aloulou et al., 2023). Similarly, studies by Chao et al. (2024) and Al-Matari et al. (2022) emphasize the need for research that includes other financial institutions like microfinance organizations and credit unions.

The rapidly evolving Fintech landscape necessitates ongoing research to track the dynamic relationship between Fintech and financial development (Ismail et al., 2024). Current studies, such as those by Kamara and Bao-rong (2024) & Aduba, Asgari, and Izawa (2023), indicate that findings may become less applicable over time, highlighting the need for continuous analysis to reflect current trends. Likewise, Phan et al. (2024) emphasized that their timeframes might not reflect current trends. Moreover, Wu et al. (2024) suggest that future research should expand to include the

impact of financial crises. Understanding how Fintech adoption performs during economic downturns could provide valuable insights into its resilience and effectiveness in promoting financial sector development.

The study shows that simply adopting technology may not be enough to improve financial development. It suggests to explore how other factors, influence financial outcomes (Phan et al., 2024). Integrating financial literacy as a factor in future research could provide valuable insights to make Fintech solutions more effective and promote sustainable financial development (Kamara & Bao-rong, 2024; Kodongo, 2024; Adel., 2024).

Future research on these gaps will give deeper and broader insights to the contribution of Fintech adoption to financial development, enriching further the body of knowledge.

Index Formation for Fintech Adoption and Financial Development

Current studies in this domain have used distinct indicators to evaluate the degree of Fintech adoption. Some have focused on digital crowdfunding and digital lending (Cevik, 2024; Elekdag et al., 2024; Rabbani et al., 2022). Similarly, researcher have utilized mobile phone usage, ATM networks and fixed broad band (Ismail et al., 2024; Rahman et al., 2023; Sethi and Manocha, 2023). Other studies have considered e-government online service index and telecommunication index (Ullah and Pinglu, 2024; Wang, Nhieu and Liu, 2024). In addition, some other studies have also used financial service providers (including Fintech startups) as indicators of Fintech adoption or growth (Yudarin et al., 2023; Othman et al., 2021). As a result, there is an obvious need for additional research in this area to establish a more thorough and unified understanding of the Fintech adoption to the development of financial sector. Based on prior research, the study identifies four key dimensions - innovation, channel, support, and provider - that should be examined concurrently to comprehensively understand the impact of Fintech adoption on various dynamics in a global context. This involves analyzing large panel data across countries and exploring heterogeneity by income level and region. Additionally, for comparative financial sector studies, the study recommends utilizing text mining approaches, as employed in numerous existing studies (Tong and Yang, 2024; Khan et al. 2023). In addition, the problem of multicollinearity that is associated with the variables in the analysis is suitably solved by using the Principal Component Analysis (PCA). However, to the author's knowledge, there is still no database or empirical data

offering a long-horizon time series for the Fintech index; all the more, there is no universally standard and stable measure for Fintech across years. As a result, it is argued that this index is an evolutionary improvement in the evaluation of Fintech. Fintech adoption dimension (Global context)
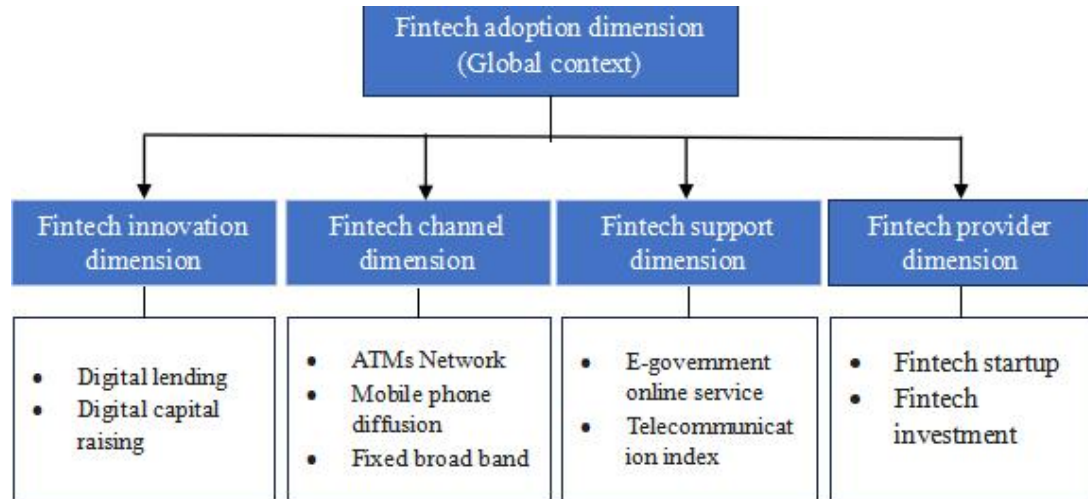

Figure 6. Fintech adoption dimension (Global context)

Source: Author

Fintech Adoption Dimension (Financial Sector Context)
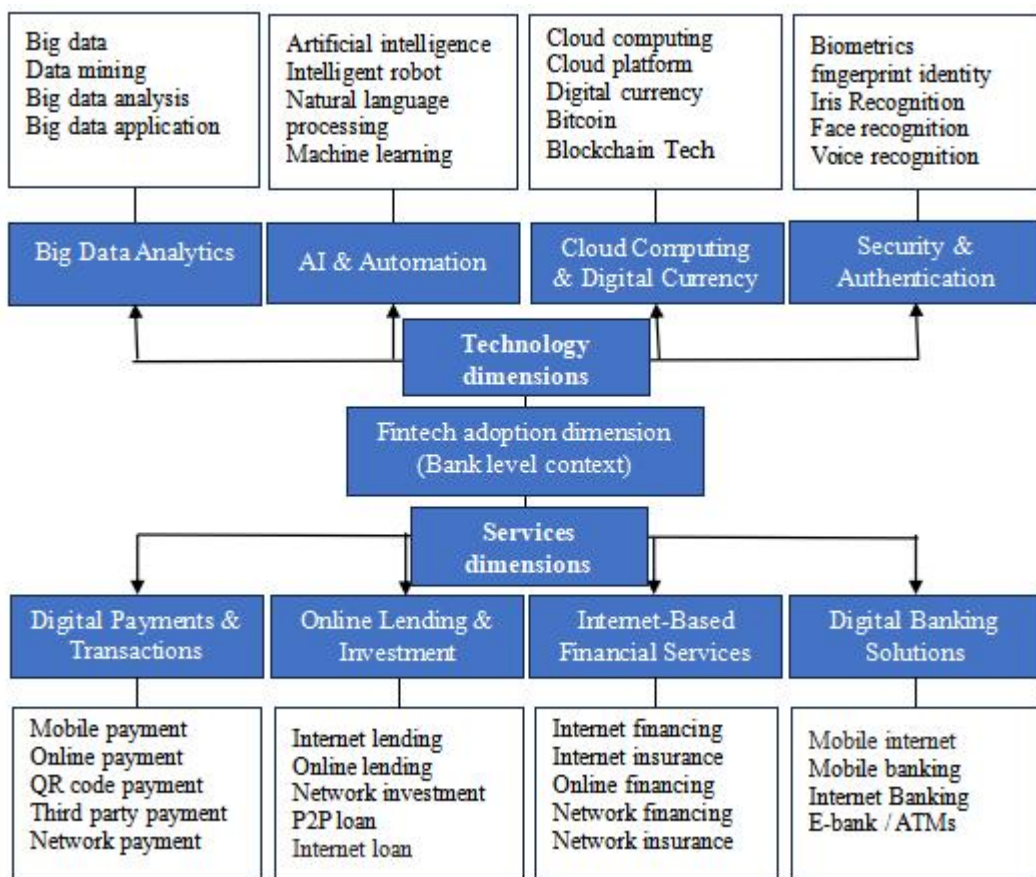

Figure 7. Fintech Adoption Dimension (Bank-Level Context)

Source: Author

Financial Development

An effective measure of financial development is of utmost importance in evaluating the progress of the financial sector. However, due to its broad scope and multi-faceted nature, measuring financial development in practice is challenging (Muganyi et al., 2022). So far, most empirical studies have relied on commonly used quantitative indicators that have been available for long time series across several countries. However, it is important to note that these measures are only approximate estimations emphasizing quantity over quality and do not cover all aspects of financial development (Aduba, Asgari and Izawa, 2023; Svirydzenka, 2016). For instance, while China's financial deepening surpasses that of the U.S. and nearing Japan's level, it is not considered globally advanced due to inefficiencies and systemic risks. True financial development requires improving the quality and functionality of financial systems. Thus, improving financial functionality is more crucial than merely expanding its scale.

In order to quantify financial development, the Global Financial Development Database of the World Bank has developed a conceptual 4x2 framework that is both comprehensive and relatively easy to understand. There is need for studies to includes these dimensions in order to provide a more comprehensive and reliable set of findings. Building on the framework developed by Svirydzenka, this study constructs a financial development pyramid. Following the study, Ajide et al., 2023 and Cihak et al., (2013) the future studies can formulate financial development index using PCA.
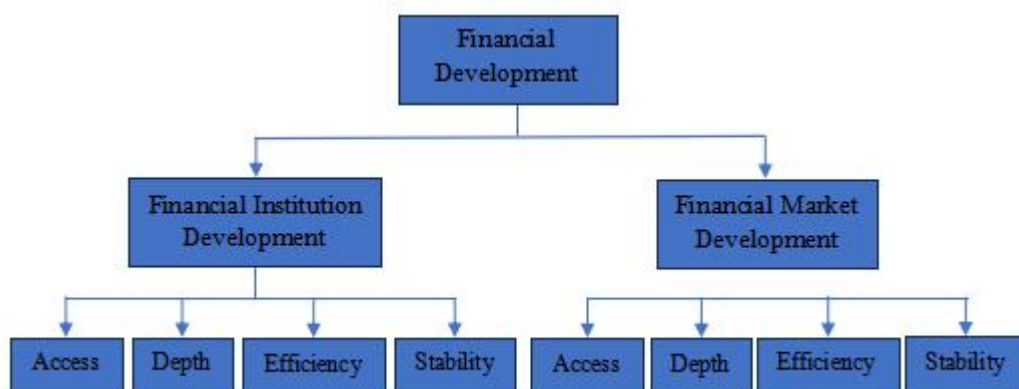
The Financial Development Pyramid

Figure 8. The Financial Development Pyramid

Source: Author

Table 6: The Dimension and Indicators of Financial Development

Variable	Measurement formula	Source
Financial institution access	Financial institution access index: Index of financial institution access: ATMs per 100,000 adults, bank branches per 100,000 adults	IMF
Financial institution depth	Financial institution depth index: Bank credit to the private sector as a percentage of GDP, private sector credit to GDP, pension fund assets to GDP, mutual fund assets to GDP, and life and non-life insurance premiums to GDP	IMF
Financial institution efficiency	Financial institution efficiency index: Net interest margin, non-interest income to total income, Lending-deposits spread, Overhead (OH) costs to total assets, return on assets, Return on equity	IMF
Financial institution stability	Nonperforming loan	WDI
Financial market access	Financial market access: The proportion of market capitalization that is not among the top ten largest companies and Total number of debt issuers (both external and domestic, financial and nonfinancial firms)	IMF
Financial market depth	Financial market depth index: Stock market capitalization to GDP, International debt securities of government to GDP, Stocks traded to GDP, Total debt securities of financial corporations and non-financial corporations to GDP	IMF
Financial market efficiency	Stock market turnover ratio (stocks traded / capitalization)	IMF
Financial market stability	Stock price volatility	WDI

Source: Author's own work

Conclusion

The existing literature on Fintech adoption in the context of financial development remains in its nascent stage and scattered, suggesting a need for more comprehensive empirical investigations to elucidate whether it poses a threat or presents an opportunity for the financial sector, thereby providing a wide scope for future research, particularly by focusing on unified global measures for these two multifaceted concepts.

Policy Implications and Recommendations

Policy Implications

Fintech-Friendly Regulatory Frameworks

● Establish and outline clear regulations to encourage competition and innovation in the Fintech sector while ensuring financial stability (Aleemi et al., 2023; Junarsin et al., 2023). In this relam, (Cevik, 2024) specifically recommends "...modernizing legal principles and macroprudential policies..."

● Conduct research and development for new financial innovations are crucial to drive innovation and address emerging challenges and opportunities (Aloulou et al., 2023).

● Legal framework needs to be strengthened to improve consumer protection accompanied by contract implementation, and enhancing trust in digital financial platforms (Aleemi et al., 2023).

Infrastructure Development

● Promoting technological advancements by strengthening mobile networks and fixed and active broadband access, to support Fintech adoption across the population (Ismail et al., 2024).

● Reduce the digital divide by improving easy equal access to financial services, especially in underserved areas (Wu & Wang, 2022; Goswami et al., 2022).

Financial Literacy and Consumer Protection

● Implement programs to enhance financial and digital literacy, empowering individuals to effectively use and manage Fintech services while protecting them against risks like fraud (Kodongo, 2024; Khan et al., 2023).

Collaboration and Innovation

● Develop inclusive financial products through innovative initiatives such as regulatory sandboxes, open APIs, and tailored support for startups (Goswami et al., 2022; Cevik, 2024).

- Promote partnership between Fintech companies and traditional financial institutions to generate new synergistic financial solutions and to effectively utilize competencies of each side (Chouhan et al., 2023; Aleemi et al., 2023). Cevik, (2024) specifically emphasizes the need for "..greater collaboration and coordination in developing common standards and regulatory principles."

Monitoring and Evaluation

- Continuously monitor the Fintech's role on financial access, depth, efficiency and stability, adapting policies based on empirical evidence and rapidly evolving technological landscapes (Lavrinenko et al., 2023; Phan et al., 2024).

- Establish longitudinal studies to assess Fintech long-term impacts on financial sector and ensure that Fintech contributes to sustainable development goals (Hoque, 2024; Phan et al., 2024).

Addressing Fintech Risks

- Reduce the identified risks such as, systemic vulnerabilities, market instability, and regulatory arbitrage by proactively implementing timely interventions (Curcio et al., 2024; Aleemi et al., 2023).

- To address the issue of cybersecurity threats and data privacy concerns associated with Fintech, strong cybersecurity frameworks need to be constructed (Lavrinenko et al., 2023)

- Develop global regulatory frameworks for Fintech innovations to address risks in international financial systems (Curcio et al., 2024). Regulations should encourage greater transparency and data sharing within the Fintech ecosystem to mitigate information asymmetry and enhance risk assessment capabilities (Elekdağ et al., 2024).

Financial Sector Recommendations

Strategic Adaptation

- Encouraging financial institutions to partner with Fintech firms or develop Fintech capabilities to remain competitive in the evolving financial landscape (Junarsin et al., 2023). Khan et al., 2023 suggest "...investing in the capacity building of banks and regulatory institutions to understand the dynamics of risks posed by Fintech adoption."

- Create a well-defined strategy for integrating Fintech solutions into existing traditional operations. This should involve identifying areas where Fintech can have the greatest impact, such as customer service, operational efficiency and risk

management (Dhanraj et al., 2024).

- Adopt process digitalization and customers-oriented strategies for the increase in service quality and revenue (Citterio et al., 2024; Elekdağ et al., 2024).

Risk Management

- Prioritize maintaining strong liquidity levels and capital adequacy to mitigate the risks posed by Fintech competition and digital transformation (Junarsin et al., 2023).

- The use of data analytics for better decision-making and risk assessments should be enhance (Tong & Wang, 2024).

Through policy implication and recommendations presented above, policymakers and financial institutions will optimize on opportunities offered by Fintech as well as minimize on risks associated with Fintech.

Limitation of Study

The study exclusively uses 51 studies from ScienceDirect and Google Scholar, which not only limits its scope but may also not capture the full spectrum of insights on Fintech adoption and financial development. Future research for SLRs should try to include more articles from various databases in order to achieve a better holistic view. Additionally, the future study should focus on emerging technologies like blockchain, AI, DeFi, crowdfunding, and digital lending to identify impactful innovations versus transient trends. This broader and forward-looking approach will help to further broaden the understanding of Fintech's role in financial development.

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