

Blockchain and Decentralized Finance in Fintech Startups in Emerging Markets: A Systematic Literature Review of Opportunities and Challenges

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Abstract

This study examined the role of blockchain technology and decentralized finance (DeFi) in the growth of fintech startups within emerging markets, while also exploring challenges hindering blockchain adoption. Guided by two objectives, to assess blockchain and DeFi's contributions to fintech development and to identify adoption barriers, the research employed a systematic literature review of 46 peer-reviewed articles published in English within the last decade. Sources were drawn from reputable databases. A quality assessment checklist ensured the validity and relevance of selected studies, and thematic analysis aligned findings with the research questions. Results revealed five key benefits of blockchain and DeFi for fintech startups: fostering innovative business models, reducing transaction costs, and expanding access to capital through tokenization. However, several challenges persist, including regulatory uncertainty, technological and cost barriers, privacy and data security concerns, limited inter-organizational trust, resistance to change, and scalability issues. This study contributes to the finance and banking literature by synthesizing evidence on blockchain's potential to transform fintech ecosystems in emerging markets. The findings suggest that clear regulatory frameworks and strengthened technological infrastructure are critical to facilitating blockchain adoption. Limitations include the study's cross-sectional design and focus on emerging markets, indicating the need for further empirical research.

JEL classification numbers: G20, G23, O16, O33.

Keywords: Blockchain technology, decentralized finance (DeFi), fintech startups, emerging markets, adoption challenges, tokenization, transaction costs, transparency, innovation.

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1. Introduction

In recent years, the rapid development of fintech has disrupted the provision of financial services worldwide. In this regard, blockchain technology and DeFi are two highly disruptive innovations. While blockchain provides a secure, transparent ledger for recording transactions, DeFi uses it to build financial systems that operate without intermediaries (Ozili, 2022). Cumulatively, these technologies work hand in hand to provide more efficient means of transaction processing, access to credit, and operational management. This transformational technology is highly significant for emerging markets, mainly because traditional financial infrastructure struggles to meet demand, whether from startups or from unprivileged sections of society. In emerging markets, blockchain and DeFi offer an alternative to curb the inefficiencies of traditional systems, which entail high transaction costs, limited access to banking services, and a lack of transparency. They cut out the middleman, offering quicker, safer, and more affordable financial services, innovation and scale are possible. This innovation will benefit all kinds of FinTech startups, which can now leverage this development in blockchain and DeFi to offer new business models needed in their regions. Emerging market firms often face structural institutional constraints, including limited financial infrastructure, regulatory inefficiencies, and reduced access to capital, making technological innovations such as blockchain particularly important for enabling competitive participation in global markets (Luo & Zhang, 2016).

Entrepreneurship in emerging markets faces many barriers: high transaction costs, limited access to finance, and a general lack of trust in the conventional banking system (Fernandez-Vazquez et al., 2019; Renduchintala et al., 2022). There are also challenges associated with a lack of trust and financial inclusion in traditional financial systems. According to Naderi (2021), blockchain offers significant promise for addressing challenges and enabling emerging markets to compete globally. Even so, Kumari and Devi (2022) indicate that the adoption of blockchain technology in emerging markets is still in its infancy, and fintech entrepreneurs still face significant challenges, including regulatory challenges, technological barriers, lack of awareness and knowledge on blockchain and DeFi, security and privacy issues, as well as scalability challenges. There is a need to understand how blockchain technology is transforming emerging markets and the barriers to realizing its full potential.

The study was, therefore, guided by the following objectives:

1. Identify the impact of blockchain technology on fintech startups in emerging markets.
2. Explore challenges in adopting blockchain and DeFi in these contexts.

This research is important to various stakeholders, including entrepreneurs, investors, policymakers, and researchers. Fintech startups operate in emerging markets where conventional financial systems might be inaccessible or inefficient, leaving large sections of the population unserved. Blockchain and DeFi thus offer workable solutions, enabling greater transparency and potentially lower costs,

thereby widening access to financial services (Fernandez-Vazquez et al., 2019). This study also provides further insight into the opportunities and constraints of blockchain diffusion by examining how these technologies interact with the strategies and practices of Fintech startups. The results will help entrepreneurs overcome systemic barriers; they will also help policymakers design enabling regulatory frameworks and investors identify high-potential blockchain ventures. The rest of the paper is organized as follows: *Methodology*, which outlines the methods used in the study, including search strategies, inclusion and exclusion criteria, and analysis techniques. *Blockchain and Decentralized Finance: A theoretical framework that gives a brief overview of related works and the theoretical basis for the study*. The *findings* section provides an in-depth analysis of the results from the analyzed articles; the discussion section contextualizes these findings within the broader literature; the *implications for practice and policy* section provides recommendations for research, fintech startups, and policymakers; and the *limitations* section addresses the limitations of this study.

2. Literature Review

Various studies have analyzed DeFi as a response to traditional funding mechanisms in emerging markets. One way through which DeFi is improving funding mechanisms is through peer-to-peer lending. DeFi lending platforms enable crypto loans without intermediaries, creating a trustless system. Users can list their cryptocurrencies on these platforms for lending, while borrowers can access loans directly through peer-to-peer (P2P) lending mechanisms. Lenders benefit by earning interest on their assets. Among decentralized applications (DApps), DeFi lending has experienced the fastest growth and plays a leading role in locking crypto assets, making it a key driver in the DeFi ecosystem.

DeFi lending platforms offer several benefits, including faster loan origination, enabled by technologies such as cloud-based services, machine learning, and fraud-detection analytics. These tools speed up the loan approval process and allow quick e-contract offers. The platforms also ensure greater consistency in lending decisions by applying standardized credit policies, eliminating variations in how loan applications are evaluated. Additionally, DeFi platforms comply with regulations by documenting their decision-making rules and ensuring adherence to federal, state, and local laws. Analytics further enhance the process by helping lenders optimize resources and improve portfolio profitability. DeFi lending is permission-less, giving anyone with a crypto wallet access, regardless of location or fund size. Furthermore, smart contracts automate processes, enabling the creation of new financial instruments, while interoperability allows DeFi applications to work seamlessly together. Finally, DeFi platforms offer self-custody, giving users complete control over their assets and data through Web3 wallets like MetaMask. From a financial intermediation perspective, DeFi fundamentally alters traditional credit markets by enabling peer-to-peer lending that reduces dependence on centralized intermediaries. This disintermediation lowers transaction costs and

broadens access to credit, particularly for underserved populations in emerging markets. Such developments are aligned with credit intermediation theory, which highlights the role of financial intermediaries in reducing information asymmetry and transaction costs. By automating loan origination and approval via smart contracts, DeFi platforms streamline credit allocation and enhance transparency. Moreover, digital assets underlying these platforms contribute significantly to financial inclusion by allowing users without access to traditional banking services to participate actively in lending and borrowing activities. This transformation holds promise for emerging markets where high transaction costs and limited banking infrastructure often constrain efficient credit intermediation.

DeFi has also significantly impacted traditional banking by eliminating intermediaries, a process known as disintermediation. In traditional banking, banks facilitate transactions between savers and borrowers, manage payments, and provide investment services. DeFi removes these intermediaries by enabling direct transactions between parties through smart contracts (Sarmah, 2018). This shift not only reduces transaction costs but also increases transaction speed. Unlike traditional bank transfers, which can take days and involve high fees, DeFi transactions are completed in minutes with minimal fees, making it particularly appealing for remittances and international transfers (Christodoulou et al., 2024; Tripathi et al., 2023). Additionally, DeFi enhances transparency and trust by operating on public blockchain networks, where all transactions are recorded on an immutable ledger. This transparency reduces the risk of fraud and corruption, allowing users to independently verify transaction integrity, unlike in traditional banking, where customers rely on internal controls. This makes it easier for startups to access the funding they need for their businesses. Block-chain technology is increasingly transforming traditional banking operations by enabling decentralized payment infrastructure, improving settlement efficiency, and reducing reliance on centralized financial institutions, thereby enhancing financial system resilience and operational transparency (Marr, 2018).

The Fintech Entrepreneurship Ecosystem (FEE) has increasingly attracted the attention of investors and researchers as fintech continues to revolutionize financial systems by offering innovative methods for delivering essential financial services, particularly to underserved populations (Bischof et al., 2021; Chen & Bellavitis, 2020; Hacıoglu, 2020). Despite its rapid growth, fintech research remains in its early stages and lacks a strong theoretical and empirical foundation (Puschmann, 2017). The sector encompasses areas such as retail banking, fundraising, investment management, and, more recently, digital payments, where blockchain has emerged as the leading application (Leong & Sung, 2018). Digital payment transactions increased from \$4.1 trillion in 2019 to \$5.2 trillion in 2020, reflecting fintech's transformative influence on financial operations (Bischof et al., 2021). Fintech and blockchain were identified as catalysts reshaping business efficiency and convenience, while advancements in emerging economies enhance productivity, reduce costs, and stimulate innovation (Elia et al., 2022; Mention, 2019). Blockchain enables the development of new digital infrastructures that allow firms

to redefine value creation, delivery, and capture through reconfigured value chains, shops, and networks (Bhatti et al., 2021; Weking et al., 2020). Blockchain also introduces new financial market structures by enabling decentralized value exchange systems, digital asset ownership models, and alternative financing mechanisms that reshape traditional financial intermediation and improve efficiency in capital markets (Hacioglu, 2020). Fintech entrepreneurial ecosystems play a critical role in facilitating blockchain adoption, as accelerators, innovation hubs, and financial networks provide startups with the institutional support, funding access, and technological infrastructure necessary to scale blockchain-based financial services (Harris, 2021). Both permissioned and permissionless blockchain architectures have demonstrated the ability to enhance transaction transparency, operational efficiency, and trust among financial market participants, thereby supporting broader diffusion of blockchain innovation across the financial sector (Helliard et al., 2020).

A comprehensive review by Taherdoost and Madanchian (2023) covering 533 studies found that blockchain fosters peer-to-peer innovation, democratizes access, and secures value exchange through tokenization and encryption. However, challenges such as energy-intensive algorithms, scalability constraints, and high operational costs remain obstacles to widespread adoption, particularly in developing regions (Weking et al., 2020). From a financial intermediation perspective, DeFi fundamentally alters traditional credit markets by enabling peer-to-peer lending that reduces dependence on centralized intermediaries. This disintermediation lowers transaction costs and broadens access to credit, particularly for underserved populations in emerging markets. Such developments are aligned with credit intermediation theory, which highlights the role of financial intermediaries in reducing information asymmetry and transaction costs (Chen & Bellavitis, 2020; Hacioglu, 2020). In automating loan origination and approval via smart contracts, DeFi platforms streamline credit allocation and enhance transparency. Moreover, digital assets underlying these platforms contribute significantly to financial inclusion by allowing users without access to traditional banking services to participate actively in lending and borrowing activities. This transformation holds promise for emerging markets where high transaction costs and limited banking infrastructure often constrain efficient credit intermediation. The adoption of blockchain and DeFi by fintech startups aligns directly with both Transaction Cost Theory (TCT) and the Resource-Based View (RBV). Transaction Cost Theory explains that firms adopt governance structures to minimize coordination, monitoring, and enforcement costs, which blockchain technology reduces through automation and decentralized verification (Cuypers et al., 2021; Ketokivi & Mahoney, 2020). From a TCT perspective, blockchain and DeFi eliminate intermediaries and enable peer-to-peer ex-changes, increasing efficiency (Catalini & Gans, 2020; Prewett et al., 2020). From the RBV perspective, blockchain represents a strategic technological resource that provides sustainable competitive advantage (Barney et al., 2021; Mejia & Lemarroy, 2022).

3. Research Methodology

This study employed a qualitative systematic literature review (SLR) to investigate the challenges faced by fintech startups and the roles of blockchain and DeFi in addressing these challenges. A SLR identifies, selects, and critically appraises research to answer a formulated question (Dewey & Drahota, 2016). The guideline for systematic literature review was used, as proposed by Peterson (2008). PRISMA compliance. This systematic review was conducted in accordance with the PRISMA 2020 guidelines (Page et al., 2021). Protocol registration. The review protocol was not registered in PROSPERO or any other registry. Based on this study's objectives, the research questions that guided the search were defined, as summarized in Table 1.

Table 1: Summary of research questions research

Question	Aim
How do blockchain technology and decentralized finance DeFi contribute to the growth and development of fintech startups, particularly in emerging markets?	This research question explores how blockchain technology and decentralized finance contribute to the growth of fintech startups, particularly in emerging markets, by addressing challenges such as limited access to capital, inefficiencies, and financial exclusion.
What were the key challenges and barriers to entry faced by fintech entrepreneurs in adopting blockchain technology in emerging markets?	This question aimed to identify and analyze the obstacles that fintech entrepreneurs encountered, including regulatory uncertainties, high costs, a lack of expertise, and inadequate infrastructure.

This systematic review collected articles from various online databases, including Emerald, IEEE, Web of Science, ScienceDirect, Springer, MDPI, and Google Scholar. The search for these studies was conducted in November 2024. The keywords used for each database search are summarized in Table 2 below. Search strategies were adapted to each database's indexing system, but the core search structure was consistent. Parentheses and Boolean operators were used to refine and structure the search queries. An example search string is shown: "Blockchain" AND "Fintech" AND "Emerging Markets") OR ("Decentralized Finance" OR "DeFi") AND ("Financial Inclusion"). Additionally, the keywords were slightly tailored across databases due to their differing indexing algorithms and search capabilities. For instance, databases like IEEE and Springer prioritize technical terminology, so more specific terms such as "Decentralized Finance" or "Business Models" are emphasized. In contrast, broader academic databases like Google Scholar required a more inclusive key-word structure to capture relevant interdisciplinary studies. According to Creswell & Plano Clark (2023), carefully selecting keywords is essential to determine the quality and relevance of the articles retrieved for the study. At the end of this step, 678 articles were identified across all databases. This

included records from Emerald, IEEE, ScienceDirect, Springer, MDPI, Google Scholar, and Web of Science. Following duplicate removal ($n = 340$), 338 unique records remained. Of these, 170 were excluded during title and abstract screening due to a lack of relevance to fintech startups, a lack of focus on blockchain or DeFi, or studies centered on developed rather than emerging markets. Subsequently, full-text retrieval was attempted for 168 studies, but 113 could not be retrieved due to paywall restrictions, inaccessible links, and broken URLs. Therefore, 55 full-text articles were assessed for eligibility; 9 were excluded for not meeting the inclusion criteria, leaving 46 included in the final synthesis. The study selection process is summarized in Figure 1 following the PRISMA 2020 flow diagram.

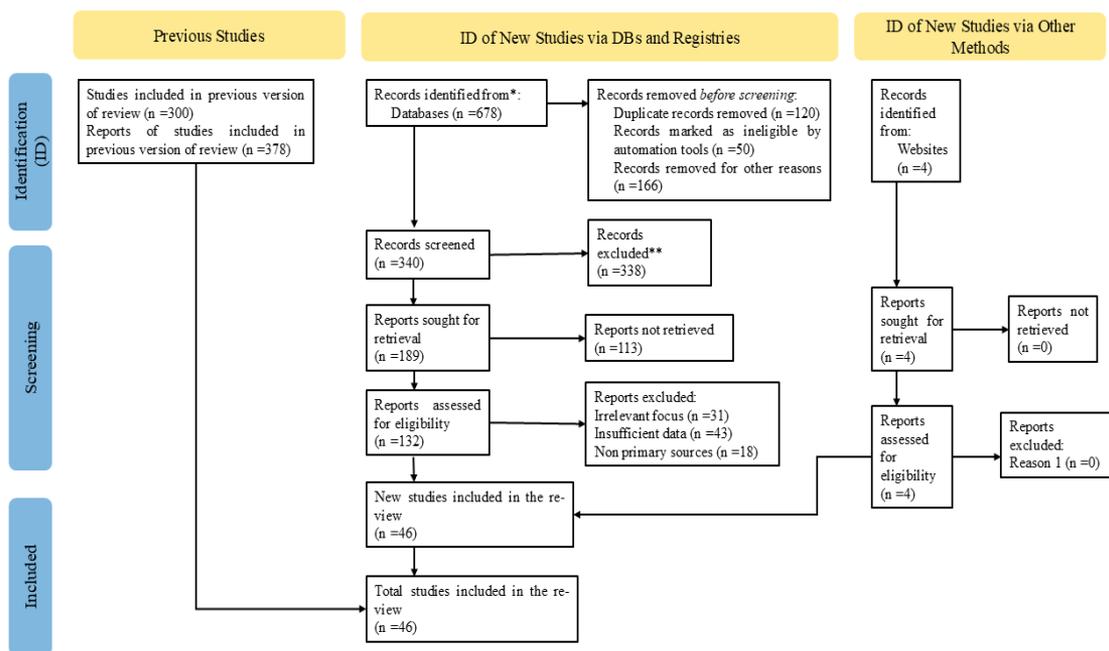


Figure 1: PRISMA 2020 flow diagram of the study selection process

A comprehensive search was performed across multiple electronic databases, including Emerald, IEEE, Web of Science, ScienceDirect, Springer, MDPI, and Google Scholar. The search was conducted in November 2024 using tailored keyword combinations relevant to blockchain, DeFi, fintech startups, and emerging markets (Table 2). Boolean operators and parentheses were used to refine search queries, adapting to each database's indexing system to maximize retrieval of relevant studies.

Table 2: Summary of keywords used for the search

Database	Keywords
Emerald	"Blockchain" "Fintech," AND "Emerging Markets"
IEEE	"Decentralized Finance" OR "DeFi" AND "Blockchain Technology" AND "Financial Inclusion"
ScienceDirect	"Blockchain" AND "Financial Technology" AND "Emerging Markets" AND "Startup Growth"
Springer	"Blockchain Technology" AND "Decentralized Finance" AND "Business Models" AND "Fintech Startups"
MDPI	"Blockchain" AND "Fintech" AND "DeFi" AND "Financial Inclusion" AND "Emerging Markets"
Google Scholar	"Blockchain" AND "DeFi" AND "Financial Inclusion" OR "Startup Innovation" AND "Emerging Markets" AND "Technology"
Web of Science	"Blockchain Technology" AND "Fintech" AND "Emerging Markets" OR "Decentralized Finance" AND "Startup Growth"

The inclusion and exclusion steps involved selecting the relevant papers to answer the research questions. Two independent reviewers applied the inclusion criteria and screened each retrieved record and report. Initially, titles and abstracts were reviewed to exclude irrelevant studies, followed by a full-text review of potentially relevant studies. Disagreements were resolved through discussion with a third reviewer. To do so, a set of inclusion and exclusion criteria was developed, summarized in Table 3 below.

Table 3: Exclusion and Inclusion Criteria

Criteria Type	Inclusion Criteria	Exclusion Criteria
Study Type	Peer-reviewed journal articles, conference papers, and book chapters.	Non-peer-reviewed sources such as blogs, opinion pieces, or unpublished reports.
Language	Studies published in English.	Studies not published in English.
Time Frame	Articles published within the last 10 years (2014-2024).	Studies published before 2014.
Geographic Focus	Studies focusing on emerging markets (e.g., Asia, Africa, Latin America).	Studies focusing exclusively on developed markets (e.g., North America, Western Europe, Australia).
Methodology	Empirical studies, case studies, systematic reviews, and theoretical papers relevant to blockchain and DeFi in fintech startups in emerging markets.	Opinion pieces, editorials, or papers without a clear research methodology or empirical analysis.
Technology Focus	Studies that analyze blockchain technology, decentralized finance, and their application in fintech startups.	Studies focusing on other emerging technologies (e.g., AI, IoT) without focusing on blockchain or DeFi in fintech.

The remaining articles from section 3.1.2 were subjected to the inclusion and exclusion criteria defined in Table 3. Only articles that met the criteria were included, and duplicate publications, surveys, and literature reviews were filtered out based on the title, abstract, and keywords. As a result of this selection process, 294 publications and 46 relevant publications were examined for this SLR.

The required information to address this study's research questions was collected. Two independent reviewers collected data from each included report using a standardized data extraction form to ensure consistency and minimize bias. These criteria were piloted on 46 publications in the systematic review to ensure consistency and relevance.

The extracted data were analyzed according to three pre-determined key themes aligned with the research questions: venues, applications, benefits, and challenges. To assess the effectiveness of blockchain technology in supporting fintech startups in emerging markets, a hybrid coding approach was employed, combining both deductive and inductive strategies. Deductive codes were developed ex-ante, based on well-established categories in the literature, such as transparency, decentralization, cost-efficiency, and security. These categories formed the initial analytical framework. However, during full-text review, additional themes emerged inductively from the data. For example, "user trust" and "regulatory workarounds" were identified as sub-themes under the broader categories. Two independent reviewers applied the coding scheme to the same subset of articles to ensure consistency. Any disagreements in the coding process were resolved through discussion and consensus. Intercoder re-liability was assessed using Cohen's Kappa, yielding a score of 0.82, indicating substantial agreement. Each key theme further generated sub-themes through detailed data analysis. The findings for each theme were visually illustrated through tables and graphs, and the papers corresponding to each theme were systematically categorized and counted.

The risk of bias in included studies was assessed using the Cochrane Risk of Bias Tool for systematic reviews. Two independent reviewers evaluated each study, resolving disagreements through discussion. Automation tools were not used for bias assessment.

4. Results and Discussion

This section reports the findings of the 46 research studies analyzed in this systematic literature review to answer the research questions. The distribution of articles was as follows: Emerald contributed 3 articles, IEEE contributed 7 articles, ScienceDirect contributed 12 articles, Springer contributed 14 articles, MDPI contributed 6 articles, and Google Scholar contributed 4 articles. The findings were organized into themes from the articles concerning the research questions. The distribution of the articles across the publication databases is summarized in Figure 2 below.

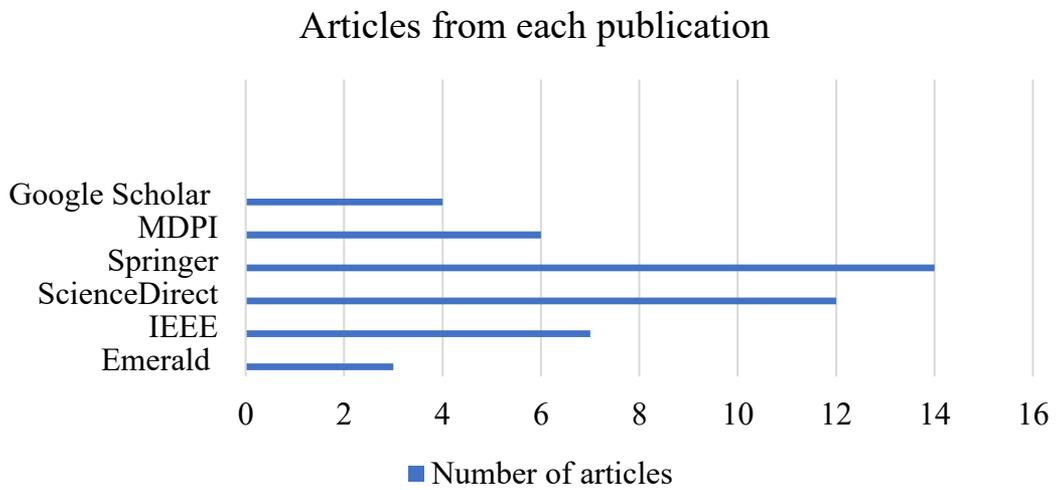


Figure 2: Number of articles per publication database

Also, the list of articles considered in this study were published between 2014 and 2024. Figure 3 summarizes the list of articles by their publication year.

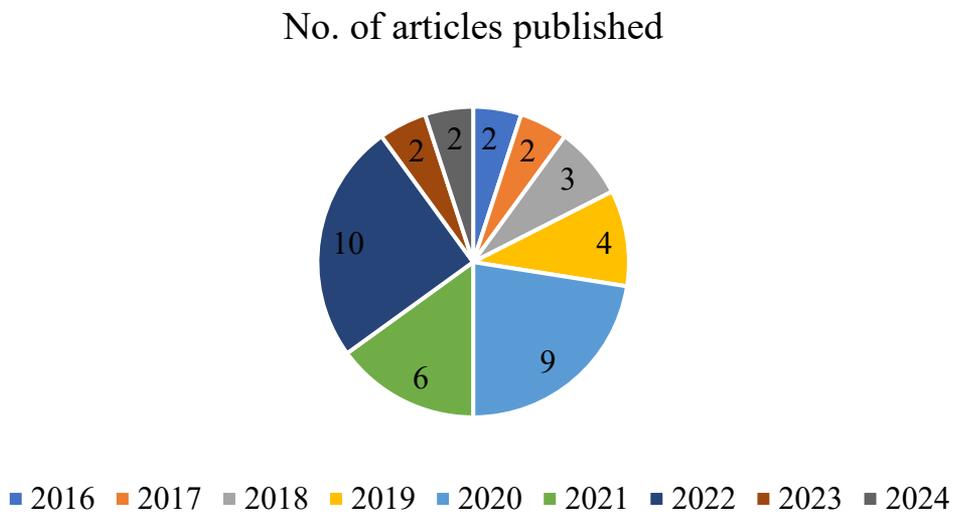


Figure 3: Summary of publications each year

The risk of bias assessment was summarized in table 4 below.

Table 4: Risk of Bias Assessment

Source	Type of Bias	Risk of Bias Assessment	Notes
Morkunas et al. (2019)	Selection Bias	Moderate	Focuses on blockchain's benefits without addressing limitations or diverse perspectives.
Nowiński & Kozma (2017)	Reporting Bias	Moderate	Highlights potential without sufficient evidence for real-world application or challenges.
Xu & Vadgama (2022)	Selection Bias	Low	Comprehensive discussion includes both opportunities and some limitations.
Mougayar (2016)	Selection Bias	High	Overemphasis on benefits like DAOs without providing balanced evidence or examples of drawbacks.
Tiscini et al. (2020)	Reporting Bias	Low	Provides balanced insights with data on cost reductions and feasibility challenges.
Chen & Bellavitis (2020)	Selection Bias	Moderate	Emphasizes DeFi benefits but overlooks broader market barriers.
Taherdoost & Madanchian (2023)	Reporting Bias	Low	Examines both benefits and risks of DeFi, offering a well-rounded analysis.
Henten & Windekilde (2019)	Selection Bias	Moderate	Focuses on cost reduction but lacks critical analysis of blockchain's broader implications.
Ahluwalia et al. (2020)	Reporting Bias	Moderate	Leans towards emphasizing cost-saving benefits without extensive empirical evidence.
Kfoury (2021)	Selection Bias	Moderate	Limited scope on retail, underexplores scalability and technological challenges.
Jabbar & Dani (2020)	Reporting Bias	Low	Offers a detailed investigation of transaction vs. computational costs with minimal bias.
Herold et al. (2022)	Selection Bias	Moderate	Discusses benefits in government but provides limited context on broader blockchain adoption.
Wilkie & Smith (2021)	Reporting Bias	Moderate	Highlights efficiencies but lacks exploration of constraints like regulatory barriers.

Shahab & Allam (2020)	Selection Bias	Moderate	Focuses on tradable permits without addressing blockchain's scalability issues.
Chen et al. (2022)	Selection Bias	Low	Well-rounded discussion of governance and transaction costs.
Javaid et al. (2022)	Reporting Bias	Moderate	Explores financial services but underrepresents challenges like accessibility and infrastructure.
De Giovanni (2020)	Selection Bias	Low	Balanced discussion on smart contracts and supply chain management.
Sanyaolu et al. (2024)	Reporting Bias	Moderate	Emphasizes financial inclusion but provides limited case studies.
Muneeza et al. (2018)	Selection Bias	Low	Offers comprehensive analysis on crowdfunding, addressing both benefits and barriers.
Ahamad et al. (2022)	Selection Bias	Moderate	Focuses heavily on trust improvement but underrepresents scalability or privacy challenges.
Centobelli et al. (2022)	Reporting Bias	Low	Balanced assessment of trust and transparency improvements.
Kowalski et al. (2021)	Selection Bias	Low	Discusses both advantages and challenges of trust improvements.
Mention (2019)	Reporting Bias	Moderate	Emphasizes stablecoin success without discussing market volatility risks.
Del Sarto et al. (2024)	Selection Bias	Moderate	Highlights digital identities without delving into risks like data breaches.
Kumari & Devi (2022)	Selection Bias	Moderate	Focuses on financial inclusion benefits with limited discussion on implementation challenges.
Lewis et al. (2017)	Reporting Bias	Low	Offers a well-rounded analysis of blockchain's role in identity creation.
Morrow & Zarrebini (2019)	Selection Bias	Low	Provides balanced insights into tokenization benefits and risks.
Wang & Nixon (2021)	Selection Bias	Moderate	Discusses tokenization benefits but lacks exploration of market accessibility challenges.

The subsequent sections were organized around research questions and themes derived from them.

4.1 Impact of blockchain technology and DeFi in the growth and development of fintech startups in emerging markets (Theme 1)

This theme was developed to answer the research question above. As shown in Figure 2, seven categories of the roles played by blockchain and DeFi in fintech startups were identified. A total of 27 articles yielded findings on this theme.

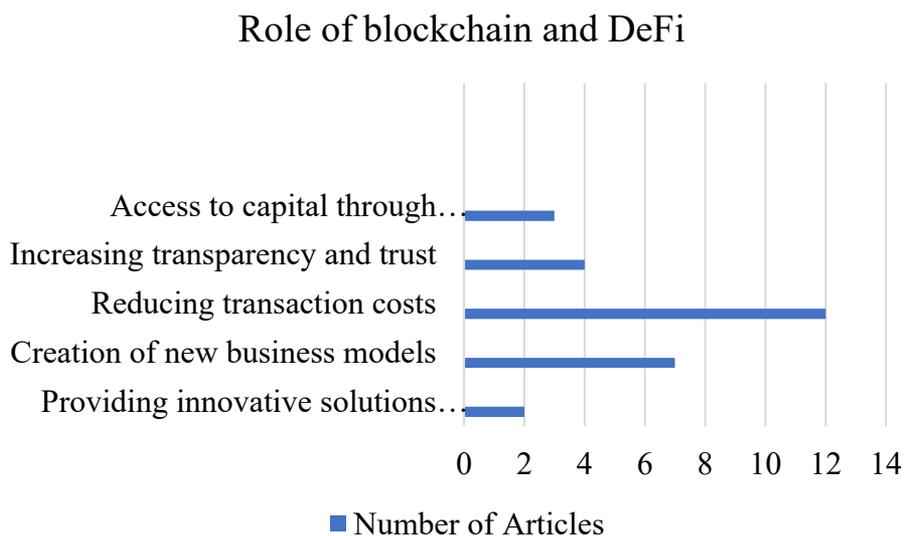


Figure 4: Summary of the number of articles related to the impact of blockchain and DeFi in emerging markets.

4.1.1 Creation of new business models

N=7 articles discussed the potential of blockchain in creating new business models, as summarized in Table 5.

Table 5: How blockchain promotes the creation of new business models

Source	How Blockchain and DeFi promote the creation of new business models
Morkunas et al. (2019)	Explores how blockchain's decentralized nature removes the need for intermediaries in transactions. This shifts business models from traditional multi-layered systems to direct peer-to-peer interactions, reducing costs and enhancing efficiency.
Nowiński & Kozma (2017)	Discusses the role of blockchain in creating new value propositions through tokenization, smart contracts, and decentralized platforms.
Xu & Vadgama (2022)	Discusses decentralized finance platforms and blockchain-based marketplaces in allowing for the creation of new business models.
Mougayar (2016)	Discusses how blockchain enables customers to interact with businesses more dynamically, such as through decentralized autonomous organizations (DAOs).
Tiscini et al. (2020)	Blockchain-based systems reduce operational and transactional costs, making previously unfeasible business models financially viable. For instance, microtransactions and global micropayment platforms become practical.
Chen & Bellavitis (2020); Taherdoost & Madanchian (2023)	Discusses the role of DeFi in transforming traditional funding mechanisms to promote access to finance and create new business models.

4.1.2 Reducing transaction costs

Across n=12 articles, findings indicated that blockchain technology significantly reduced transaction costs, offering a lifeline to low-income individuals disproportionately affected by high fees in traditional banking systems. The role of blockchain in reducing transaction costs is summarised in Table 6 below.

Table 6: Summary of articles discussing the role of blockchain in reducing transaction costs

Source	How Blockchain/DeFi Reduces Transaction Costs
Henten & Windekilde (2019)	Discusses blockchain's ability to reduce transaction costs by eliminating intermediaries and enabling peer-to-peer transactions.
Ahluwalia et al. (2020)	Explores blockchain's role in startup financing by reducing financial transaction costs through decentralized platforms.
Kfoury (2021)	Examines blockchain's impact on lowering transaction costs in the retail industry, emphasizing cost efficiency and faster processing.
Jabbar & Dani (2020)	Investigates the relationship between transaction costs and computational costs in blockchain environments.
Herold et al. (2022)	Categorizes how blockchain reduces transaction costs under uncertainty in government operations through improved efficiency.
Wilkie & Smith (2021)	Highlights blockchain's efficiency, speed, and cost-reduction capabilities in business operations.
Shahab & Allam (2020)	Discusses the reduction of transaction costs in tradable permit schemes via smart contracts.
Chen et al. (2022)	Explores blockchain governance in global value chains and its effect on transaction cost reduction.
Javaid et al. (2022)	Reviews blockchain's applications in financial services, focusing on cost reduction in transactions and remittances.
De Giovanni (2020)	Discusses how blockchain and smart contracts reduce transaction costs in supply chain management.
Sanyaolu et al. (2024)	Examines how blockchain enhances financial inclusion and reduces transaction costs in banking.
Muneeza et al. (2018)	Highlights blockchain's role in crowdfunding to lower transaction costs and promote financial inclusion.

4.1.3 Increasing transparency and trust

N=4 articles discussed the role of blockchain and DeFi in improving trust and transparency in transactions (Ahamad et al., 2022; Centobelli et al., 2022; Javaid et al., 2022; Kowalski et al., 2021). Its decentralized design ensures that no single party controls the data, making it reliable for everyone involved. Since records on the blockchain cannot be altered, users can trust that the information is accurate and secure. Utilizing advanced cryptography and secure consensus protocols, public blockchain networks are designed to make it nearly impossible for malicious actors to tamper with network data.

4.1.4 Providing innovative solutions that meet local needs

N=4 articles discussed the role of blockchain in providing innovative solutions to meet the local needs of individuals. Blockchain technology can offer new opportunities for innovative solutions. For example, stablecoin-based wallets in Argentina give savers a digital asset that hedges against inflation (Javaid et al., 2022). For people without official documents, blockchain provides a reliable way to create and verify digital identities. This is especially valuable in regions where formal ID systems are weak, such as emerging markets (Del Sarto et al., 2024; Kumari & Devi, 2022; Lewis et al., 2017). By providing a secure alternative for identity verification, blockchain expands financial inclusion, enabling more people to access banking and financial services without relying on traditional institutions.

4.1.5 Access to capital through tokenization

Blockchain technology enables access to capital through tokenization, which converts physical or intangible assets into digital tokens (Sommerhuber et al., 2022). N=2 discussed the impact of blockchain technology (Morrow & Zarrebini, 2019; Wang & Nixon, 2021). These tokens can represent anything from real estate to intellectual property and can be easily traded or invested in by a global audience. By lowering barriers to entry and increasing liquidity, tokenization democratizes investment opportunities, making it easier for individuals and businesses to raise funds and access new sources of capital.

4.2 Challenges and Barriers to Blockchain Adoption by Fintech Entrepreneurs

Nineteen articles addressed the challenges of blockchain adoption for fintech entrepreneurs. The challenges and barriers found across the literature are summarized in Table 7.

Table 7: Summary of challenges across the literature

Source	Challenges and Barriers
Underwood (2016)	Lack of understanding and awareness of blockchain technology across industries. High costs associated with blockchain integration and maintenance. Difficulty in achieving standardization across industries and organizations.
Drescher (2017)	Resistance to change from traditional supply chain practices. Concerns regarding the scalability of blockchain systems for large enterprises. Lack of clear regulatory guidelines for blockchain use in supply chains.
Zheng et al. (2017)	Technological limitations, including integration issues with legacy systems.
Marr (2018)	Limited understanding of blockchain's potential value across different industries. Difficulty in balancing transparency with data privacy requirements.
Batubara et al. (2018)	Technological aspects such as security, scalability, and flexibility. Issues of acceptability and the need for new governance models. Lack of legal and regulatory support.
Ghode et al. (2023)	Lack of trust among stakeholders in sharing transaction data. Need for policies to enhance inter-organizational trust and facilitate data sharing. Difficulty in maintaining privacy while ensuring transparency in transactions. Need for an immutable blockchain system that prevents tampering.
Singh et al. (2023)	Resistance to adopting new technology due to societal and organizational factors. Different rules and regulations across organizations hinder data sharing and interoperability.
Shen et al. (2020)	Need for policies to enhance inter-organizational trust and facilitate data sharing.
Li & Kassem (2021)	High initial costs of implementation and maintenance of blockchain systems.
Lanzini et al. (2021)	Issues with the scalability of blockchain solutions for larger supply chain networks.
Bag et al. (2021)	Regulatory uncertainty regarding the use of blockchain in various industries. High energy consumption in proof-of-work blockchain systems.
Chang et al. (2020)	Difficulty in integrating blockchain with legacy systems and infrastructures. Legal and regulatory challenges in cross-border blockchain transactions.
Zachariadis et al. (2019)	High cost of blockchain implementation and maintenance for small and medium enterprises. Lack of infrastructure and expertise to implement blockchain in supply chains.
Zhang et al. (2020)	Data privacy and confidentiality concerns related to the use of blockchain.
Gaur (2020)	Lack of trust in the transparency provided by blockchain systems.
Bai et al. (2022)	Lack of awareness and understanding of blockchain's potential among supply chain partners. High cost of implementation and infrastructure for blockchain solutions.
Momoh et al. (2021)	Interoperability issues with existing technologies and blockchain systems.
Mahjoub et al. (2022)	Lack of understanding of the value blockchain brings to supply chain efficiency. Limited availability of a skilled workforce to implement and maintain blockchain systems. Technological limitations in ensuring data privacy and system scalability.
Prewett et al. (2020)	Limited legal framework and unclear regulations surrounding blockchain adoption.

The article above identified seven major categories of blockchain adoption, summarized in Figure 5.

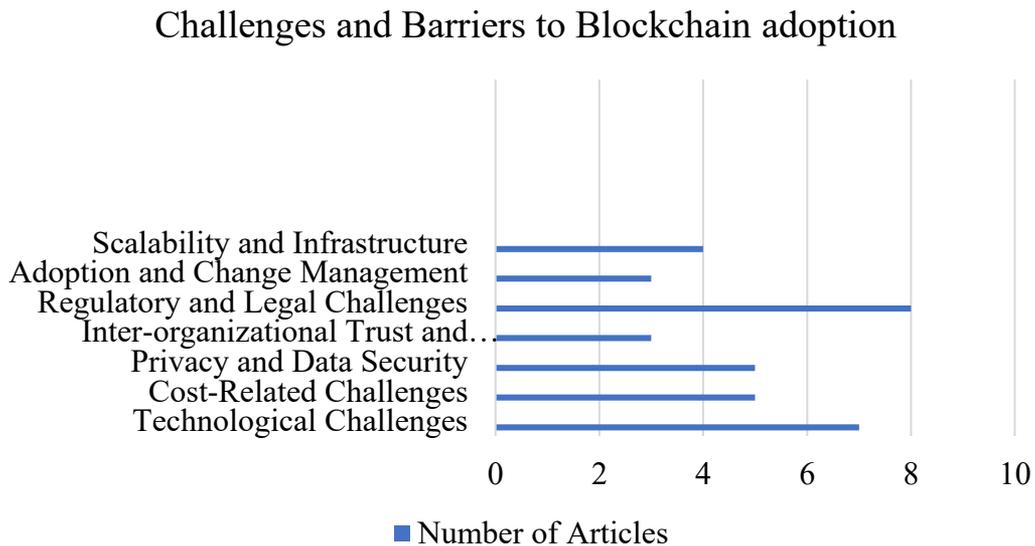


Figure 5: Summary of the challenges and barriers to blockchain implementation from the 19 articles.

4.2.1 Regulatory and Legal Challenges

The regulatory environment surrounding blockchain technology is often unclear, especially regarding cross-border transactions and industry-specific guidelines. Many businesses struggle with a lack of clear regulations or legal frameworks for blockchain adoption, leading to uncertainty in implementing the technology in compliance with laws. These challenges are highlighted in studies like Bag et al. (2021), Batubara et al. (2018), Chang et al. (2020), Drescher (2017), and Prewett et al. (2020), which emphasize the need for clear legal frameworks to ensure that blockchain adoption is both feasible and compliant with existing laws.

4.2.2 Technological barriers

Technological challenges in adopting blockchain include integration with legacy systems, scalability, security, and the flexibility of blockchain solutions. Many organizations face difficulties integrating blockchain with existing systems, especially when those systems were not initially designed to interact with it (Nawari & Ravindran, 2019). Additionally, while blockchain systems are touted as a strength, they still face concerns about vulnerabilities, particularly as they scale up, as noted by Batubara et al. (2018), Chang et al. (2020), Underwood (2016), Zheng et al. (2017).

4.2.3 Cost-related challenges

The implementation and maintenance costs of blockchain technology can significantly hinder its adoption, especially for smaller enterprises. High initial setup costs and ongoing operational expenses for managing blockchain infrastructure can deter organizations from adopting the technology. Additionally, the need for specialized infrastructure and expertise further exacerbates these costs. This challenge is discussed in sources such as Bai et al. (2022), Batubara et al. (2018), Gaur (2020), Li & Kassem (2021), and Zachariadis et al. (2019).

4.2.4 Privacy and Data Security

Maintaining privacy while ensuring transparency in blockchain transactions is one of the most difficult challenges. Blockchain's inherent transparency might conflict with the need to protect sensitive data, creating a tension between public visibility and confidentiality. Issues related to data privacy and confidentiality concerns are also heightened by the use of decentralized networks, where control over sensitive data may be more diffuse. Sources addressing these challenges include Ghode et al. (2023), Marr (2018), and Zhang et al. (2020), all of which examine how data privacy and security concerns may impede the widespread adoption of blockchain technology across industries.

4.2.5 Inter-organizational Trust and Collaboration

Trust among stakeholders in the blockchain network is vital for its successful adoption. Organizations may be reluctant to share sensitive transaction data without trust, limiting blockchain's potential to improve supply chain visibility. Policies are needed to enhance interorganizational trust and encourage collaboration, as without these mechanisms, organizations might hesitate to adopt the technology. Sources such as Drescher (2017), Ghode et al. (2023), and Shen et al. (2020) emphasize that building trust is essential for blockchain adoption, especially in sectors where data sharing is critical to operational efficiency.

4.2.6 Adoption and Change Management

Resistance to adopting new technology is a common challenge across industries. Organizational and societal factors, such as reluctance to change established practices, create significant barriers to blockchain adoption. Sources such as Ghode et al. (2023), Singh et al. (2023), and Zhang et al. (2020) discuss how change management strategies and effective communication about blockchain's advantages can help overcome these barriers to adoption.

4.2.7 Scalability and Infrastructure

Scalability is a primary concern when implementing blockchain solutions in large supply chains. Blockchain systems may struggle to scale efficiently when dealing with vast amounts of data, making them unsuitable for large enterprises with complex networks. Infrastructure limitations, including the need for specialized

systems and expertise, also hinder organizations' ability to adopt blockchain. Challenges related to scalability and infrastructure are discussed in sources such as Lanzini et al. (2021), Momoh et al. (2021), and Zachariadis et al. (2019).

5. Case studies of successful and unsuccessful blockchain implementation

Table 8: Summary of case studies on successful blockchain implementation

Case Study	Reason for Success
Mobile Payments in Kenya (M-Pesa)	M-Pesa leveraged blockchain for cross-border mobile payments, leading to widespread adoption in Kenya, where mobile penetration is high. The simplicity, low cost, and integration with existing mobile systems made blockchain payments highly accessible, fostering financial inclusion.
Cross-Border Payments in the Philippines (Cebuana Lhuillier)	Successful implementation of blockchain for remittance services. Blockchain reduced transaction fees and processing times, providing a faster, more cost-effective alternative for cross-border transfers, which was crucial for a country with a large overseas workforce.
Brazilian Central Bank (Projeto de Moeda Digital)	Brazil successfully implemented a blockchain-based central bank digital currency (CBDC) to facilitate faster and more efficient transactions. The CBDC addressed regulatory concerns and integrated well with existing financial infrastructure, promoting financial stability and inclusion.
JPMorgan's Liink (Collaborative Blockchain Network)	The blockchain-based payment platform Liink, was successfully deployed to reduce friction in international payments. The platform provided real-time settlements and transparency, benefiting emerging markets by reducing delays, fraud, and high fees in financial transactions.
South Africa's Bankymoon Blockchain-Based Payments	Bankymoon implemented a blockchain system for micro-payments, helping unbanked individuals access financial services. By reducing fees, ensuring secure transactions, and enabling decentralized payment solutions, Bankymoon facilitated financial inclusion in underserved regions.

Table 9: Case studies on unsuccessful blockchain implementation

Case Study	Reason for Failure
Tanzania's eFinance Blockchain Project	Struggled with regulatory approval, lack of trust from local institutions, and technological limitations. The project faced challenges integrating blockchain into the established financial infrastructure and lacked buy-in from government authorities.
El Salvador's Bitcoin as Legal Tender	Despite its ambition to incorporate Bitcoin into the financial system, the project faced resistance from local businesses and the public due to Bitcoin's volatility. Lack of education, digital literacy, and infrastructure led to limited success in the financial sector.
Nigeria's Blockchain for Financial Inclusion (PayStack)	The initiative faltered due to difficulties in securing partnerships with local banks, issues with cross-border payments, and concerns over integrating blockchain with legacy banking systems. Low awareness and trust in cryptocurrency hindered adoption among local businesses and consumers.
Argentina's RSK Blockchain for Finance	RSK's blockchain integration for digital finance faced difficulties due to unstable regulatory environments, macroeconomic instability, and inflation. These issues made it difficult for blockchain to gain traction in the financial sector, with limited consumer and business adoption.

The findings from the 46 studies analyzed reveal a strong alignment between the literature on blockchain and DeFi adoption in fintech startups and the theoretical frameworks of Transaction Cost Theory (TCT) and the Resource-Based View (RBV). Consistent with Catalini and Gans (2020) and Prewett et al. (2020), evidence across multiple studies (e.g., Chen et al., 2022; Henten & Windekilde, 2019; Jabbar & Dani, 2020) demonstrates that blockchain and DeFi substantially reduce transaction costs by eliminating intermediaries, enabling peer-to-peer exchanges, and automating verification through smart contracts. This supports TCT's assertion that organizations adopt structures that minimize transaction inefficiencies. Moreover, as noted by Morkunas et al. (2019) and Tiscini et al. (2020), these cost reductions enable the emergence of new, previously unviable business models, particularly in low-income or underbanked markets. Similarly, in line with RBV (Barney et al., 2021), blockchain and DeFi technologies serve as valuable, rare, and hard-to-imitate resources that provide fintech startups with competitive advantages through innovation, transparency, and improved access to capital (Chen & Bellavitis, 2020; Morrow & Zarrebini, 2019). DeFi's role in promoting peer-to-peer lending and tokenized assets demonstrates how startups leverage these resources to deliver tailored, cost-effective solutions that enhance financial inclusion in emerging markets (Taherdoost & Madanchian, 2023).

Furthermore, the literature highlights blockchain's contribution to trust and transparency (Ahamad et al., 2022; Centobelli et al., 2022), reinforcing its strategic value as both a technological and reputational asset. However, despite these advantages, persistent challenges such as scalability, high implementation costs, and unclear regulatory frameworks continue to limit broader adoption. Overall, the reviewed studies validate that integrating blockchain and DeFi into fintech ecosystems supports TCT by reducing operational inefficiencies and aligns with RBV by enabling firms to harness blockchain's unique capabilities as a source of sustained competitive advantage in emerging financial markets (Rindfleisch, 2020). FinTech continues to evolve rapidly as emerging technologies such as blockchain, artificial intelligence, and digital platforms reshape traditional financial services and entrepreneurial opportunities (Jalal et al., 2023).

6. Policy Discussion

The study highlighted several challenges and opportunities for startups adopting blockchain and decentralized finance, including barriers to user adoption, interoperability issues, and the need for secure platforms. Fintech startups can strengthen security measures during blockchain adoption to prevent data breaches and promote consumer trust. The findings also indicated that blockchain technology reduces costs and makes services available to low-income individuals. For example, Stellar, a blockchain payment network, has successfully lowered cross-border transaction costs, making it easier for individuals in underserved markets to access financial services. Fintech startups can use blockchain adoption to offer more efficient and affordable services. The complexities of blockchain implementation underscore the need for collaborative efforts to navigate its adoption successfully. The study also revealed significant insights into challenges, including unclear regulatory frameworks, cybersecurity risks, and the challenges of maintaining compliance across fragmented regulatory frameworks. Based on these findings, policymakers can establish clear guidelines to reduce uncertainty and foster a favorable environment for blockchain adoption. For example, the approach taken by Singapore's financial authorities, which has developed a clear regulatory framework for blockchain and DeFi, could serve as a model. The study also highlighted fragmentation between regulatory bodies and industry players, leading to ineffective policy implementation. Policymakers could benefit from creating collaborative forums or regulatory sandboxes, such as those implemented by the UK Financial Conduct Authority, where fintech startups can test new technologies in a controlled environment, reducing the financial and regulatory compliance burden. These actions could help to minimize risks while promoting innovation. While this study discussed the challenges impeding blockchain adoption, future studies can focus on how to address them. Specifically, studies could investigate ways to improve blockchain scalability. Ethereum's transition to Ethereum 2.0, with its move from proof-of-work to proof-of-stake, is one example of how scalability can be enhanced. Another challenge is interoperability with legacy systems, which

could be addressed by exploring cross-chain solutions like Polkadot, which enables different blockchains to interoperate. Developing clear regulatory frameworks is another area for future research; one potential example is investigating Switzerland's approach to blockchain regulation, which provides a clear legal framework for blockchain-based businesses. Additionally, researchers could explore strategies to educate fintech entrepreneurs and regulators about blockchain's potential, as seen in initiatives such as Blockchain for Education, which offers resources and training for industry professionals. Given that the focus of this study was on emerging economies, future studies can also compare emerging and developed markets through longitudinal research.

7. Limitations and Data Availability

This study had several limitations. The studies used were cross-sectional, so causality between the impact and challenges to adoption could not be established. The focus of this study was also solely on emerging markets, which limits the generalizability of these findings to more developed economies. Extending the findings to more developed economies would have provided a comparative basis for understanding blockchain adoption in different contexts. Moreover, only 46 articles were used for this study, which could possibly have limited the depth of insights obtained. A larger pool of articles might have allowed for a more comprehensive understanding of the various dimensions of blockchain adoption and its challenges. The use of SLR also entails reliance on secondary research, so the findings of this study are contingent on the quality of the original research. While secondary data offered valuable insights, this approach did not capture firsthand experiences of fintech entrepreneurs or the real-world dynamics of blockchain adoption in emerging markets. Future studies could incorporate empirical methods, such as interviews or surveys, to deepen the analysis and provide more actionable insights for fintech startups.

References

- [1] Ahamad, S., Gupta, P., Acharjee, P. B., Kiran, K. P., Khan, Z., & Hasan, M. F. (2022). The role of block chain technology and Internet of Things (IoT) to protect financial transactions in crypto currency market. *Materials Today: Proceedings*, 56, 2070-2074.
- [2] Ahluwalia, S., Mahto, R. V., & Guerrero, M. (2020). Blockchain technology and startup financing: A transaction cost economics perspective. *Technological Forecasting and Social Change*, 151, 119854.
- [3] Bag, S., Viktorovich, D. A., Sahu, A. K., & Sahu, A. K. (2021). Barriers to adoption of blockchain technology in green supply chain management. *Journal of global operations and strategic sourcing*, 14(1), 104-133.
- [4] Bai, C., Quayson, M., & Sarkis, J. (2022). Analysis of Blockchain's enablers for improving sustainable supply chain transparency in Africa cocoa industry. *Journal of Cleaner Production*, 358, 131896.

- [5] Barney, J. B., Ketchen Jr, D. J., & Wright, M. (2021). Resource-based theory and the value creation framework. *Journal of Management*, 47(7), 1936-1955.
- [6] Batubara, F. R., Ubacht, J., & Janssen, M. (2018, May). Challenges of blockchain technology adoption for e-government: a systematic literature review. In *Proceedings of the 19th annual international conference on digital government research: governance in the data age* (pp. 1-9).
- [7] Bhatti, S. H., Santoro, G., Khan, J., & Rizzato, F. (2021). Antecedents and consequences of business model innovation in the IT industry. *Journal of Business Research*, 123, 389-400.
- [8] Bischof, J., Laux, C., & Leuz, C. (2021). Accounting for financial stability: Bank disclosure and loss recognition in the financial crisis. *Journal of Financial Economics*, 141(3), 1188-1217.
- [9] Catalini, C., & Gans, J. S. (2020). Some simple economics of the blockchain. *Communications of the ACM*, 63(7), 80–90. <https://doi.org/10.1145/3359552>
- [10] Centobelli, P., Cerchione, R., Del Vecchio, P., Oropallo, E., & Secundo, G. (2022). Blockchain technology for bridging trust, traceability and transparency in circular supply chain. *Information & Management*, 59(7), 103508.
- [11] Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J., & Arami, M. (2020). How Blockchain can impact financial services–The overview, challenges and recommendations from expert interviewees. *Technological forecasting and social change*, 158, 120166.
- [12] Chen, W., Botchie, D., Braganza, A., & Han, H. (2022). A transaction cost perspective on blockchain governance in global value chains. *Strategic Change*, 31(1), 75-87.
- [13] Chen, Y., & Bellavitis, C. (2020). Blockchain disruption and decentralized finance: The rise of decentralized business models. *Journal of Business Venturing Insights*, 13, e00151. <https://doi.org/10.1016/j.jbvi.2019.e00151>
- [14] Christodoulou, I., Rizomyliotis, I., Konstantoulaki, K., Nazarian, A., & Binh, D. (2024). Transforming the remittance industry: Harnessing the power of blockchain technology. *Journal of Enterprise Information Management*, 37(5), 1551-1577.
- [15] Creswell, J. W., & Plano Clark, V. L. (2023). *Designing and conducting mixed methods research (4th ed.)*. Sage Publications.
- [16] Cuypers, I. R., Hennart, J. F., Silverman, B. S., & Ertug, G. (2021). Transaction cost theory: Past progress, current challenges, and suggestions for the future. *Academy of Management Annals*, 15(1), 111-150.
- [17] De Giovanni, P. (2020). Blockchain and smart contracts in supply chain management: A game theoretic model. *International Journal of Production Economics*, 228, 107855.
- [18] Del Sarto, N., Gai, L., & Ielasi, F. (2024). Financial innovation: the impact of blockchain technologies on financial intermediaries. *Journal of Financial Management, Markets and Institutions*, 12(01), 2350005.

- [19] Dewey, A., & Drahota, A. (2016). Introduction to systematic reviews: Online learning module. Cochrane Training. <https://training.cochrane.org/interactivelearning/module-1-introduction-conducting-systematic-reviews>
- [20] Drescher, D. (2017). Planning the blockchain: the basic concepts of managing ownership with the blockchain. In *Blockchain Basics: A Non-Technical Introduction in 25 Steps* (pp. 57-62). Berkeley, CA: Apress.
- [21] Elia, G., Stefanelli, V., & Ferilli, G. B. (2022). Investigating the role of Fintech in the banking industry: what do we know?. *European Journal of Innovation Management*, 26(5), 1365-1393.
- [22] Fernandez-Vazquez, S., Rosillo, R., De La Fuente, D., & Priore, P. (2019). Blockchain in FinTech: A mapping study. *Sustainability*, 11(22), 6366.
- [23] Fosso Wamba, S., Kala Kamdjoug, J. R., Epie Bawack, R., & Keogh, J. G. (2020). Bitcoin, Blockchain and Fintech: a systematic review and case studies in the supply chain. *Production Planning & Control*, 31(2-3), 115-142.
- [24] Gaur, N. (2020). Blockchain challenges in adoption. *Managerial Finance*, 46(6), 849-858.
- [25] Ghode, D. J., Yadav, V., Jain, R., & Soni, G. (2023). Exploring the integration of blockchain technology into supply chain: challenges and performance. *Business Process Management Journal*, 29(1), 223-239.
- [26] Hacioglu, U. (2020). *Blockchain economics and financial market innovation*. Springer, Switzerland.
- [27] Harris, J. L. (2021). Bridging the gap between 'Fin' and 'Tech': The role of accelerator networks in emerging FinTech entrepreneurial ecosystems. *Geoforum*, 122, 174-182.
- [28] Helliard, C. V., Crawford, L., Rocca, L., Teodori, C., & Veneziani, M. (2020). Permissionless and permissioned blockchain diffusion. *International Journal of Information Management*, 54, 102136.
- [29] Henten, A., & Windekilde, I. (2019). Blockchains and transaction costs. *Nordic and Baltic Journal of Information & Communications Technologies*, 33-52.
- [30] Herold, D. M., Saberi, S., Kouhizadeh, M., & Wilde, S. (2022). Categorizing transaction costs outcomes under uncertainty: a blockchain perspective for government organizations. *Journal of Global Operations and Strategic Sourcing*, 15(3), 431-448.
- [31] Jabbar, A., & Dani, S. (2020). Investigating the link between transaction and computational costs in a blockchain environment. *International Journal of Production Research*, 58(11), 3423-3436.
- [32] Jalal, A., Al Mubarak, M., & Durani, F. (2023). Financial technology (fintech). In *Artificial Intelligence and Transforming Digital Marketing* (pp. 525-536). Cham: Springer Nature Switzerland.
- [33] Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Khan, S. (2022). A review of Blockchain Technology applications for financial services. *Bench Council Transactions on Benchmarks, Standards and Evaluations*, 2(3), 100073.

- [34] Ketokivi, M., & Mahoney, J. T. (2020). Transaction cost economics as a theory of supply chain efficiency. *Production and Operations Management*, 29(4), 1011-1031.
- [35] Kfoury, B. (2021, May). The role of blockchain in reducing the cost of financial transactions in the retail industry. In *WCNC-2021: Workshop on Computer Networks & Communications* (Vol. 1).
- [36] Kowalski, M., Lee, Z. W., & Chan, T. K. (2021). Blockchain technology and trust relationships in trade finance. *Technological forecasting and social change*, 166, 120641.
- [37] Kumari, A., & Devi, N. C. (2022). The impact of fintech and blockchain technologies on banking and financial services. *Technology Innovation Management Review*, 12(1/2), 1-11.
- [38] Lanzini, F., Ubacht, J., & De Greeff, J. (2021). Blockchain adoption factors for SMEs in supply chain management. *Journal of Supply Chain Management Science*, 2(1-2), 47-68.
- [39] Leong, K., & Sung, A. (2018). FinTech (Financial Technology): what is it and how to use technologies to create business value in fintech way? *International Journal of Innovation, Management and Technology*, 9(2), 74-78.
- [40] Lewis, R., McPartland, J., & Ranjan, R. (2017). Blockchain and financial market innovation. *Economic Perspectives*, 41(7), 1-17.
- [41] Li, J., & Kassem, M. (2021). Applications of distributed ledger technology (DLT) and Blockchain-enabled smart contracts in construction. *Automation in construction*, 132, 103955.
- [42] Luo, Y., & Zhang, H. (2016). Emerging market MNEs: Qualitative review and theoretical directions. *Journal of International Management*, 22(4), 333-350.
- [43] Mahjoub, Y. I., Hassoun, M., & Trentesaux, D. (2022). Blockchain adoption for SMEs: opportunities and challenges. *IFAC-PapersOnLine*, 55(10), 1834-1839.
- [44] Marr, B. (2018, December 10). Is this the end of blockchain? *Forbes*. <https://www.forbes.com/sites/bernardmarr/2018/12/10/is-this-the-end-of-blockchain/>.
- [45] Martino, P. (2021). *Blockchain and banking: How technological innovations are shaping the banking industry*. Springer Nature.
- [46] Mejia, P. S. M., & Lemarroy, P. M. (2022). Financial technologies in the emerging markets. In *Data Analytics Applications in Emerging Markets* (pp. 1-22). Singapore: Springer Nature Singapore.
- [47] Mention, A. L. (2019). The future of fintech. *Research-Technology Management*, 62(4), 59-63.
- [48] Momoh, M. O., Chinedu, P. U., Nwankwo, W., Aliu, D., & Shaba, M. S. (2021). Blockchain adoption: applications and challenges. *International Journal of Software Engineering and Computer Systems*, 7(2), 19-25.
- [49] Morkunas, V. J., Paschen, J., & Boon, E. (2019). How blockchain technologies impact your business model. *Business Horizons*, 62(3), 295-306.

- [50] Morrow, M. J., & Zarrebini, M. (2019). Blockchain and the tokenization of the individual: Societal implications. *Future Internet*, 11(10), 220.
- [51] Mougayar, W. (2016). *The business blockchain: promise, practice, and application of the next Internet technology*. John Wiley & Sons.
- [52] Muneeza, A., Arshad, N. A., & Arifin, A. T. (2018). The application of blockchain technology in crowdfunding: Towards financial inclusion via technology. *International journal of management and applied research*, 5(2), 82-98.
- [53] Naderi, N. (2021). Utilizing blockchain technology in international remittances for poverty reduction and inclusive growth. *Poverty Reduction for Inclusive Sustainable Growth in Developing Asia*, 149-163.
- [54] Nawari, N. O., & Ravindran, S. (2019). Blockchain and the built environment: Potentials and limitations. *Journal of Building Engineering*, 25, 100832.
- [55] Nowiński, W., & Kozma, M. (2017). How can blockchain technology disrupt the existing business models?. *Entrepreneurial Business and Economics Review*, 5(3), 173-188.
- [56] Ozili, P. K. (2022). Decentralized finance research and developments around the world. *Journal of Banking and Financial Technology*, 6(2), 117-133.
- [57] Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*, 372.
- [58] Peterson, R. A. (2008). *Constructing effective questionnaires*. SAGE Publications.
- [59] Prewett, K. W., Prescott, G. L., & Phillips, K. (2020). Blockchain adoption is inevitable—Barriers and risks remain. *Journal of Corporate Accounting & Finance*, 31(2), 21–28. <https://doi.org/10.1002/jcaf.22415>
- [60] Puschmann, T. (2017). Fintech. *Business & Information Systems Engineering*, 59, 69-76.
- [61] Renduchintala, T., Alfauri, H., Yang, Z., Pietro, R. D., & Jain, R. (2022). A survey of blockchain applications in the fintech sector. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(4), 185.
- [62] Rindfleisch, A. (2020). Transaction cost theory: past, present and future. *AMS Review*, 10(1), 85-97.
- [63] Sanyaolu, T. O., Adeleke, A. G., Efunniyi, C. P., Azubuko, C. F., & Osundare, O. S. (2024). Harnessing blockchain technology in banking to enhance financial inclusion, security, and transaction efficiency. *International Journal of Scholarly Research in Science and Technology*, August, 5(01), 035-053.
- [64] Sarmah, S. S. (2018). Understanding blockchain technology. *Computer Science and Engineering*, 8(2), 23-29.
- [65] Shahab, S., & Allam, Z. (2020). Reducing transaction costs of tradable permit schemes using Blockchain smart contracts. *Growth and Change*, 51(1), 302-308.
- [66] Shen, M., Zhu, L., & Xu, K. (2020). *Blockchain: empowering secure data sharing* (pp. 1-130). Berlin/Heidelberg, Germany: Springer.

- [67] Singh, A. K., Kumar, V. G. R. P., Hu, J., & Irfan, M. (2023). Investigation of barriers and mitigation strategies to blockchain technology implementation in construction industry: an interpretive structural modeling approach. *Environmental Science and Pollution Research*, 30(38), 89889-89909.
- [68] Sommerhuber, M., Bobek, V., Strašek, R., & Horvat, T. (2022). Market potential of digital assets in developing countries: the case of Diem. *International Journal of Diplomacy and Economy*, 8(2), 133-168
- [69] Taherdoost, H., & Madanchian, M. (2023). Blockchain-based new business models: A systematic review. *Electronics*, 12(6), 1479.
- [70] Tiscini, R., Testarmata, S., Ciaburri, M., & Ferrari, E. (2020). The blockchain as a sustainable business model innovation. *Management Decision*, 58(8), 1621-1642.
- [71] Tripathi, A., Mishra, S., & Sharma, P. (2023). Blockchain adoption and financial inclusion: Opportunities and challenges. *Journal of Open Innovation: Technology, Market, and Complexity*, 9(1), 100025. <https://www.doi.org/10.1016/j.joitmc.2023.100025>
- [72] Underwood, S. (2016). Blockchain beyond bitcoin. *Communications of the ACM*, 59(11), 15-17.
- [73] Wang, G., & Nixon, M. (2021, December). SoK: Tokenization on blockchain. In *Proceedings of the 14th IEEE/ACM International Conference on Utility and Cloud Computing Companion* (pp. 1-9).
- [74] Weking, J., Mandalenakis, M., Hein, A., Hermes, S., Böhm, M., & Krcmar, H. (2020). The impact of blockchain technology on business models—a taxonomy and archetypal patterns. *Electronic Markets*, 30, 285-305.
- [75] Wilkie, A., & Smith, S. S. (2021). Blockchain: speed, efficiency, decreased costs, and technical challenges. In *The emerald handbook of blockchain for business* (pp. 157-170). Emerald Publishing Limited.
- [76] Xu, J., & Vadgama, N. (2022). From banks to defi: the evolution of the lending market. *Enabling the Internet of Value: How Blockchain Connects Global Businesses*, 53-66.
- [77] Zachariadis, M., Hileman, G., & Scott, S. V. (2019). Governance and control in distributed ledgers: Understanding the challenges facing blockchain technology in financial services. *Information and organization*, 29(2), 105-117.
- [78] Zhang, L., Xie, Y., Zheng, Y., Xue, W., Zheng, X., & Xu, X. (2020).
- [79] The challenges and countermeasures of blockchain in finance and economics. *Systems Research and Behavioral Science*, 37(4), 691-698.
- [80] Zheng, Z., Xie, S., Dai, H., Chen, X., & Wang, H. (2017, June). An overview of blockchain technology: Architecture, consensus, and future trends. In *2017 IEEE international congress on big data (BigData congress)* (pp. 557-564). IEEE.