

Review

# Thematic Analysis of Financial Technology (Fintech) Influence on the Banking Industry

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**Abstract:** The synthesis of technology and finance is known as financial technology (Fintech), which brings together two of the biggest industries in harmony. Fintech disruption is a deviation from the norm, resulting in a significant shift in banking services and, as a result, risk. This article aims to investigate how Fintech has influenced recent changes in the banking industry and upcoming challenges, with a particular emphasis on blockchain technology. We perform a comprehensive thematic analysis of recent studies on Fintech in the banking industry. We found that Fintech has enormous potential to grow and impact the banking industry and the entire world. The banking industry could benefit from combining emerging technologies such as blockchain, AI, machine learning, or other decision-making layers. However, with the benefits come drawbacks, such as increased reliance on technology, high costs, increased job losses, security risks related to data and fraud, and so on. The use of emerging technology and collaboration between Fintech firms and banks can improve system-wide financial stability while minimising the negative externalities of disruption and competition. These findings can help regulators, policymakers, academics, and practitioners understand the opportunities and challenges of emerging technologies in the banking industry.

**Keywords:** Fintech; banking; blockchain; cryptocurrency; emerging technologies; thematic analysis



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## 1. Introduction

The Internet of Things (IoT), cloud computing, virtual and augmented reality, blockchain, artificial intelligence (AI), and e-commerce are a few of the emerging technologies influencing the future. Technology-driven innovations accelerate the automation of well-established data collection and analysis processes. However, automation raises data security and privacy concerns, putting the relationship between technological advancement and regulation at risk. In the financial sector, incumbent banks have traditionally faced stricter regulatory requirements than start-ups that use innovative financial technology (Fintech) (Roy 2021). For incumbent banks, disruption from Fintech poses a challenge (Truby et al. 2020). On the one hand, banks are being forced to lower their risk levels, increase capital adequacy, and improve the stability of their revenue pools due to the continued escalation in regulation (Buchak et al. 2018). On the other hand, banks are threatened by technological advancements as Fintech firms may reduce the banks' market share, leading banks to make riskier investments (Rupeika-Apoga and Wendt 2021). As a result, banks must adapt to a changing environment. However, achieving innovation and agility may expose the company to new risks or jeopardise the quality of existing practices. Furthermore, according to Soloviev (2018a, 2018b), Fintech initiatives have not yet resulted in a radical transformation of the financial sector because banks, Fintech start-ups, technology companies, the state, and clients all have different perspectives on Fintech.

Our contribution to academic literature, as well as public and political debate, is two-fold. First, the existing literature on the impact of Fintech on the financial sector is

contradictory. For example, (Shoaib et al. 2020; Kuzmina-Merlino and Saksonova 2018) consider blockchain technology to be a catalyst for financial sector development, whereas other findings (Fauzi et al. 2020) associate cryptocurrencies with extremely high energy consumption, which has a negative impact not only on the financial sector but on the entire economy. We used a comprehensive thematic analysis in this study to identify the major impact streams recognised in current academic research.

Second, as emerging technologies and regulatory environments continue to develop, previous review studies might now be out of date. In order to fill this gap, the current paper offers a comprehensive literature review based on the most recent findings. Furthermore, we decided to concentrate specifically on how blockchain technologies affect banking, as blockchain has already transformed the financial world but is still in its early stages of adoption (Grima et al. 2021).

This article aims to investigate how Fintech has influenced recent changes in the banking industry and upcoming challenges, with a particular emphasis on blockchain technology.

We apply a comprehensive thematic analysis as suggested by Braun and Clarke (2006) and a PRISMA search strategy (preferred reporting elements for systematic reviews and meta-analysis) to achieve a purpose. The PRISMA search strategy was conducted in order to find as much relevant research on the topic as possible and to use explicit methods to determine what can be said with confidence based on these studies. For the final thematic analysis, 93 articles in total were extracted and shortlisted. The thematic analysis identifies four key themes and nine sub-themes that shed light on the various channels through which technological disruption affects incumbent banks and the socioeconomic environment.

The main findings show that, despite the fact that many have questioned emerging technologies such as AI, machine learning, IoT and blockchain in the banking industry for several years, their efficiency is still being questioned by many. However, they have enormous potential to grow and impact the financial industry and the entire world. For example, while standalone AI solutions have not met expectations, smaller AI applications use A.I. successfully for modelling techniques and analytics management (Fernández-Rovira et al. 2021). Blockchain and related technologies, such as digital assets and smart contracts, can significantly improve the banking industry. A blockchain (public ledger) can provide certainty and transparency about transactions in a financial market.

Fintech continues to draw investors due to its enormous untapped potential. There is still plenty of room for ground-breaking innovation. AI, big data, and management tools work best together in the field of Fintech. Fintech allows us to analyse a financial institution's performance, generate insights, and automate critical organisational processes such as team administration, documentation, and client communication. However, along with the advantages come disadvantages, such as a greater reliance on technology, often high costs associated with using the most recent technology (especially for small businesses), an increased risk of job losses, security risks related to data, fraud, etc.

Overall, the review suggests that incumbent banks should collaborate with Fintech entrants. This is expected to improve system-wide financial stability while minimising the adverse externalities of disruption and competition. Therefore, such partnerships should be encouraged by regulatory frameworks. These frameworks should consider stability and financial inclusion to realise the wider socioeconomic benefits of new technologies.

The structure of this paper is as follows. Emerging technologies and the banking industry are the main topics of the next section, Section 2. In Section 3, data and methodology are described. Results from qualitative analysis of the 13 identified themes are presented in Section 4. Section 5 concludes by discussing key themes that shed light on the various channels by which technological disruption affects incumbent banks and the socioeconomic environment.

## 2. Emerging Technologies in the Banking Industry

The market's current most disruptive and empowering force is, without a doubt, the growth of the financial technology ecosystem (Laidroo et al. 2021). Fintech refers to emerging technologies that offer novel ways of delivering financial services that are unavailable through traditional channels (Rupeika-Apoga and Thalassinos 2020). Emerging technology is an innovation that fundamentally alters how consumers, companies, and entire industries function. Because of its measurable and superior qualities, emerging technologies have the potential to replace established systems or practices. Emerging technology, to put it simply, is a new technology that fundamentally alters the way a market or industry currently operates. As a result of their potential to disrupt the status quo, emerging technologies frequently encounter initial resistance from established businesses (Barroso and Laborda 2022). They can, however, fundamentally alter how an industry runs over time. Anti-ad blocking software, online shopping, and 5G with Wi-Fi 6 are a few examples of emerging technologies. However, the potential of emerging technology is frequently underestimated (Bilan et al. 2019).

Emerging technology does not have to be novel or revolutionary; however, it must have the potential to transform a specific market or sector. Numerous sectors, ranging from agriculture to education, use this kind of technology (Chonsawat and Sopadang 2020). New technology is frequently not immediately embraced by the general public. This is due to the fact that it is frequently viewed as being too risky or unproven. However, as the technology develops, it may eventually find widespread adoption. A number of advantages could result from this, including reduced costs, higher quality, and more competition (Anshari et al. 2020). Emerging technologies have the potential to completely transform an industry and even create entirely new markets.

Emerging technologies reset consumer expectations and change how people manage and move money (Truby et al. 2020). Blockchain, cryptocurrencies, AI, IoT, cloud computing, virtual/augmented reality and e-commerce are all examples of emerging technologies used in the banking industry. Banks are using AI and machine learning in a wide range of settings. While chatbots are the forms of artificial intelligence that are most visible to the general public, AI also has an impact on back-office operations, product delivery, risk management, marketing and security (Schulte and Liu 2017). Machines use simple algorithms to carry out tasks such as data entry, risk assessment, and loan form processing, saving top banks hundreds of thousands of employee hours each year (Schulte and Liu 2017). However, AI is an emerging technology that carries risks. Systems for making poorly designed decisions have a higher chance of making mistakes, leading to legal issues and raising costs (Truby et al. 2020). These emerging banking technologies are also easily accessible to smaller banks, with tools to automate processes such as documentation, data sharing, data analysis, customer communication, and more (WEB and EVERFI 2019).

AI and machine learning contribute significantly to automation and robotics. Chatbots and automation are emerging technologies in the financial services industry that reduce man-hours, improve the quality of customer relationships, and increase profitability (Bilan et al. 2019). According to a study (Mike 2021), over 120 million workers worldwide will need to be retrained over the next few years. Robots and AI-RPAs (robotic process automation) are primarily used to automate repetitive tasks, generate reports, log data, and maintain logs. RPA, for instance, can handle instant payments by using a programmed rule to approve a payment automatically if all requirements are met. Once this transaction had been recorded, it would be updated across all servers and apps that were using the data by another RPA, which would then move the documentation into a larger file (WEB and EVERFI 2019; Mike 2021).

Blockchain is an emerging financial services technology trend that is transforming the financial world as we know it, but it is still in its early stages of adoption. This is why we decided to focus specifically on how blockchain technologies affect banking in this study. According to KPMG's study, blockchain clearly has significant impacts on the finance function, and most organisations will gradually adopt the technology as they

envision a new operating model for finance (KPMG 2019). The main potential benefits of blockchain are up to 95% reduction in errors due to the elimination of out-of-sync ledgers and reconciliations; up to 40% increase in efficiency due to straight-through processing and a single source of truth; up to 25% improvement in customer experience, due to faster processing and use of digital channels; up to 75% reduction in capital consumption, due to quicker settlement of trades, straight through processing, and freed-up capital flows (KPMG 2019). The decentralised nature of blockchain translates into the absence of regulatory bodies, which may replace control instruments from institutional actors with a more dynamically distributed environment (Velasco 2017). Blockchains with auditable ledgers and tamper-resistance provide credibility and regulation to transactions on the Internet (Wang et al. 2018). Therefore, academics examined the potential applications of blockchains in the financial industry, including open banking, tightening the regulatory framework, and enhancing credit decisions (Srivastava and Dashottar 2020).

Fintech disruption refers to a significant shift in banking services from traditional banks to neobanks. Many emerging technologies in the Fintech industry directly impact the delivery of retail banking products and services (Truby et al. 2020). As consumer and business banking practices evolve, these changes should be viewed as essential planning measures. In general, Fintech is expected to improve consumer welfare while also providing supervisory and regulatory benefits to the industry (Musabegović et al. 2019). Fintech may provide decentralised tools for enhancing system-wide resilience while avoiding the moral hazards stemming from quantitative easing and negative interest rates. This becomes relevant in the context of the global financial crisis, as traditional banks are incentivised to take excessive risks (Hayes 2016).

The provision of financial services to the general public is the key function of retail banking (Demirgüç-Kunt et al. 2020). Fintech is expected to greatly enhance the banking industry through several channels, including automation of customer segmentation processes; cost reduction in payment transactions; quality-control of customer service; optimised accounting; and expansion of the customer base (Melnychenko et al. 2020). Financial inclusion may include the provision of financial services to underserved populations with limited access to traditional financing channels (Grima et al. 2020a). The use of Fintech in retail banking is linked to system-wide stability outcomes and socioeconomic benefits. As a result, reviewing the established literature on emerging technologies in the banking industry can be beneficial.

### 3. Data and Methodology

Traditionally, there have been two competing paradigms in social science research: qualitative and quantitative. Qualitative research is commonly used to understand people's perspectives and perceptions, as it provides solutions to various problems and aids in the development of concepts or theories for future quantitative research (Beaudry and Miller 2016). In contrast, the quantitative paradigm of social research seeks to describe and explain phenomena that can be quantified as variables from an objective standpoint (Beaudry and Miller 2016). We apply qualitative research because of its descriptive and interpretive nature, which helps to provide an interpretation of Fintech's impact on the banking sector.

The research review is a popular method for analysing a large number of studies (Beaudry and Miller 2016). It provides the big picture in a field of study, identifies promising practices, and justifies future research. The three main types of reviews are narrative reviews, quantitative meta-analyses, and qualitative metasyntheses/metaethnographies. The last one, which includes thematic analysis, aids in gathering and breaking down findings, examining them, discovering key features, and combining phenomena into a transformed whole (Thorne et al. 2004).

Thematic analysis is one of the most common types of qualitative research analysis (Braun and Clarke 2006). It seeks to uncover recurrent themes and involves developing thematic headings from the individual studies and combining these to present a coherent

whole (Thorne et al. 2004). The distinction between content analysis and thematic analysis is that they are regarded as a choice between a practical and an intuitive approach. In comparison to thematic analysis, content analysis is considered simpler for data categorisation and thus “faster to get started with” (Humble and Mozelius 2022).

Since the aim of the study is to investigate how Fintech has influenced recent changes in the banking industry and upcoming challenges, with a particular emphasis on blockchain technology, we decided, as already noted above, to carry out a systematic review using the PRISMA method and carry out a thematic analysis on the resultant data.

To conduct thematic analysis, we searched popular databases such as Web of Science and Scopus for literature from 2015 to 2022. The databases were chosen because of their strength and prominence in the emerging technology research field. The following subjects have been included in the timeline: Business Management and Accounting; Social Sciences; Economics, Econometrics, and Finance; Decision Sciences; and Environmental Science. The search string used in the article was determined by the purpose of the study and the scope of the review, and it includes the following keywords: Fintech, Banks and Blockchain; applied to the databases was:

“Fintech” OR “Blockchain”) AND (“Bank” OR “Banks” OR “Banking”).

We used broad search parameters and generic best-fit phrases to find a variety of sources. Following that, we manually compared and contrasted search lists. By referring to the inclusion/exclusion criteria, studies that were not aligned with the purpose of our review were eliminated from the search. In this way, items from previous searches were discarded. If the initial search produced no significant results, a more narrow syntax would be commissioned. We obtained the most relevant search by using a specific syntax, and then we narrowed it down to Fintech’s influence on banking.

As a result, in June 2022, we selected 25,036 relevant articles (see Figure 1). We checked for duplicates and filtered the results using the inclusion/exclusion criteria; as a result, 590 articles were assessed for eligibility. After applying the PRISMA search strategy (preferred reporting elements for systematic reviews and meta-analysis), 93 literature sources were selected (Page et al. 2021).

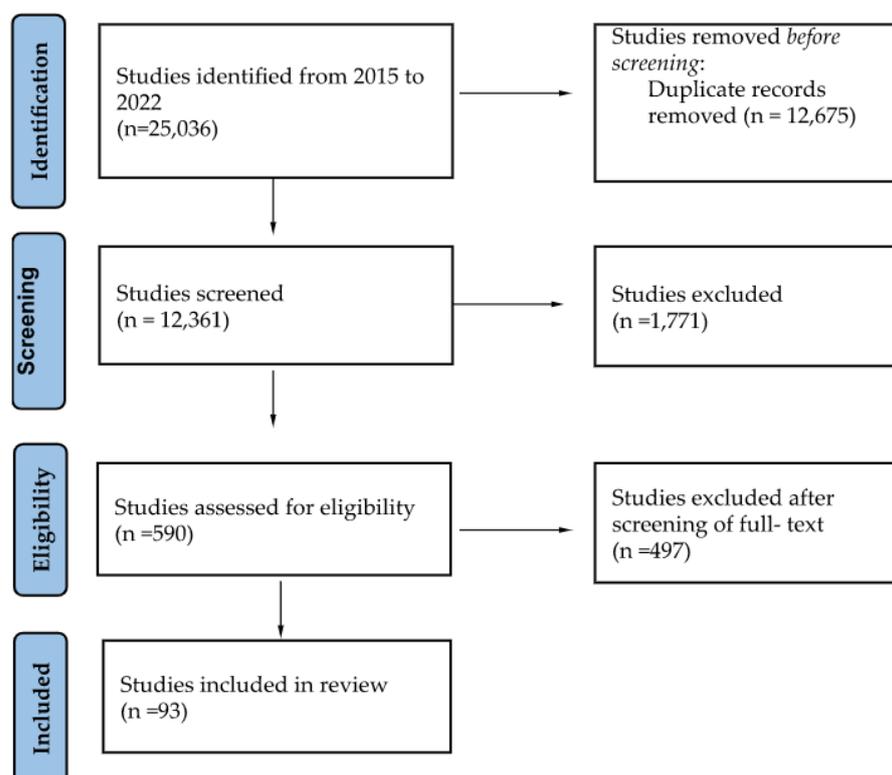


Figure 1. PRISMA flow diagram (based on Farrugia and Grima (2021)).

Ninety-three articles that qualified for the review were subjected to thematic analysis. Thematic analysis is a method for analysing qualitative data that entails searching across a data set to identify, analyse, and report repeated patterns (Braun and Clarke 2006). Themes represent the core ideas and arguments that are used to formulate and explore research questions and concepts (Liñán and Fayolle 2015). The articles were grouped together based on their common themes. Each article's relevance to one of the core topics was determined by reviewing both the abstract and the content.

The qualitative analysis of the articles revealed 13 themes and subthemes in total. They include banking, technology, blockchain, customers and consumer decision-making, machine learning, lending, fraud and cybersecurity, financial inclusion, cryptocurrency, use of blockchain in cryptocurrencies, impacts of Fintech on banking and financial sector, country-specific Fintech impacts, and blockchain in banking.

Broad themes such as "Banking", "Blockchain", and "Technology" are included alongside more specific sub-themes such as "Country-specific Fintech impacts" and "Blockchain and cryptocurrencies". This allows us to distinguish between articles that examine general challenges and opportunities in various sectors associated with the adoption of new technologies and specific issues arising from technological disruption in the financial sector. The disparity in the specificity of identified themes reflects the heterogeneity of recent academic literature in terms of scope and research questions. Additionally, some of the themes are associated with relatively less research, which may help highlight possible research gaps.

#### 4. Results

In current studies, we used a systematic literature review to identify themes related to Fintech and banking, with a special focus on blockchain. Since 2015, 93 articles have been extracted and shortlisted for the final thematic analysis. The thematic analysis identifies four key themes and nine sub-themes that shed light on the various channels by which emerging technologies affect incumbent banks and the socioeconomic environment. Researchers were paying special attention to topics related to emerging technology—blockchain and its applications—among the key themes identified. Blockchain and cryptocurrency received 44% of all research attention. With 28% of all studies, the next most popular topic was Fintech and its impact on banking. The third most studied topic, with 11% of studies, was technology and how it is used in financial services without a specific focus on concrete emerging technology. Less research has been performed on other subjects such as machine learning, fraud and cybersecurity, banking, customer and consumer decision-making, financial inclusion, and lending.

##### 4.1. Blockchain and Cryptocurrency

According to PRISMA analysis, the most popular themes among researchers are those related to blockchain technologies and their applications. Blockchain technology is a cryptographic chain of peer-to-peer transactions. Blockchain transactions are stored in a trustless manner because they are validated and committed by decentralised nodes. This theme includes the general topic of blockchain as well as two sub-themes on specific issues related to the application of blockchain technology. The first is the use of blockchain in cryptocurrencies, and the second is the use of blockchain in banking.

The world was first introduced to blockchain technology and the idea of a blockchain ecosystem by the first cryptocurrency, Bitcoin. The Bitcoin white paper, published in 2009 by the anonymous Satoshi Nakamoto, detailed a solution to the double-spend problem associated with digital peer-to-peer payments (Grima et al. 2021). However, blockchain technology is now much more than just a means of securely transferring cryptocurrencies. Indeed, the scope of the articles reviewed ranges from specific application contexts, such as autonomous vehicles and agricultural supply chains, to more general analyses of blockchain's prospects and challenges as a technology (Rijanto 2021; Melnychenko et al. 2020). While many studies highlight the advantages of the blockchain (Shoib et al. 2020;

Kuzmina-Merlino and Saksonova 2018), the shortcomings of this technology have also been discussed. The key challenges of blockchain appear to be throughput and scalability (Sanka and Cheung 2021; Rijanto 2021).

According to our research, cryptocurrency is currently the most studied issue in blockchain technology. The studies appear to be relatively heterogeneous in scope, covering a wide range of topics such as cryptocurrencies' threats and opportunities arising from their blockchain nature, sustainability and politico-economic aspects, specific platform extensions, payment schemes, and institutional responses (Zadorozhnyi et al. 2018; Parino et al. 2018). The cryptocurrency's extreme volatility and lack of regulation suggest that it serves as a supplement to traditional banking rather than a replacement (Stefan 2018). Furthermore, cryptocurrencies, as a medium of exchange, may be considered illegal by some governments (Rupeika-Apoga and Wendt 2021). The review suggests that the main vulnerabilities of cryptocurrencies stem from their use of blockchain-based protocols, often prompting forks and double-spending attacks (Anceaume et al. 2016). Blockchain forks produce transient inconsistencies in the cryptocurrency's blockchain, while double-spending attacks allow malicious actors to spend the same cryptocurrency more than once. In addition, cryptocurrencies are associated with extremely high energy consumption (Fauzi et al. 2020).

The theme "Blockchain in banking" is represented by 29 studies. The articles in this category discuss the use of blockchain in the banking industry, including features such as payment transactions, lending, open banking applications, and benefits to central banks. Hassani et al. (2018) noted that there is a gap in the existing literature regarding the use of blockchain-based big data in banking. The key subtheme of the reviewed articles emphasises that blockchain can enhance banking's industry efficiency and stability because it inherently promotes weakly-intermediated multi-centre systems (Guo and Liang 2016). In other words, blockchain is not just a technology to be applied but rather an organisational blueprint that can help shift centralised, hierarchical structures toward decentralised markets (Grima et al. 2020b).

Furthermore, blockchain is expected to increase database security, settlement speed, and automation to reduce costs (Parino et al. 2018). Blockchain-enabled smart contracts can be used for open banking (Guo and Liang 2016). However, the articles also claim that the self-governing features of blockchain would translate into system-wide improvements if properly implemented and regulated (Guo and Liang 2016). The implementation may be hindered by higher hardware costs and computing power requirements (Cocco et al. 2017). It has also been argued that the contributions of blockchain to the banking industry are limited compared to other sectors (Osmani et al. 2021).

#### 4.2. Fintech

Furthermore, for the theme Fintech, the thematic analysis revealed a general topic, "Fintech", as well as two sub-themes, one country-specific and one banking-related. The "Fintech" theme explores the threats and opportunities created by Fintech, including the issues of sustainability, regulation, and obstacles to adoption (Rupeika-Apoga and Wendt 2021; Katalina and Saksonova 2022; Grima et al. 2021).

In the reviewed articles, the gap between Fintech practices and regulation is a major challenge. The main issue raised by academics is the discrepancy in the laws related to banks and Fintech companies (Restoy 2019). Another form of the regulation gap is evident in the poor compliance of Fintech firms with institutional laws such as the anti-money laundering (AML) legislature (Katalina and Saksonova 2022). Similar to other disruptive technologies, the adoption of Fintech seems to be influenced by governmental support, brand image, user innovativeness, trust, and perceived risk (Candra et al. 2020).

The articles under the theme "Impacts of Fintech on Banking and Financial Sector" specifically address and evaluate the threats and opportunities associated with Fintech for incumbent banks. Fintech's impact varies by market and is determined by entry barriers, geographic coverage, and market structure (Shmuratko and Sheludko 2021). According to

the studies, both large and small incumbent banks recognise the importance of investing in new technology (Langley and Leyshon 2021).

The “Country-specific fintech” theme includes studies that largely agree on the premise that the regulatory environment has a significant impact on the development and success of Fintech (Hung et al. 2020). The scholars have acknowledged that the banks in developing markets such as Taiwan, Indonesia, Vietnam, Pakistan, Brazil, Colombia, and Argentina are not ready for full Fintech integration and may need to upgrade their infrastructure (Hung et al. 2020; University of Finance-Marketing et al. 2018; Kartawijaya and Hamsal 2018; Ildarovna Bulatova et al. 2019; Butt and Khan 2019; Mejia-Escobar et al. 2020). However, due to competitive pressure from disruptive innovation, Fintech development may exacerbate incumbent banks’ risk-taking (Wang et al. 2020). As for the developed economies, financial education and preference for transparency appear to play an important role in the adoption of Fintech among consumers (Jünger and Mietzner 2020).

#### 4.3. Technology

The scope of studies on the theme “Technology” ranges from the general impact of digitalisation and information technologies on the financial sector to the role of specific technologies such as robotics, big data, acyclic payment networks, block propagation, key recovery, and zero-knowledge range proofs (Tanda and Schena 2019; Roy 2021). A significant portion of the research focuses on the barriers to the adoption of new technologies. One of the barriers is a lack of computer literacy and access to appropriate educational processes (Rupeika-Apoga et al. 2022). Several articles used the Technology Acceptance Model (TAM) and its extensions to explain the low level of adoption of new technologies (Usman et al. 2022; Hayes 2016). Overall, the adoption of innovative technologies may be hindered by aspiration gaps, institutional pressures, governmental support, savings incentives, trust, ease of use, and customer IT capabilities (Kennedy et al. 2020). However, overinvesting in disruptive technology may increase risks and lead to bank destabilisation (Uddin et al. 2020).

#### 4.4. Banking and Lending

The “Banking” theme articles cover a wide range of modern banking-related topics, such as shadow banking, Islamic financing, financial institution stability and resilience, factors influencing banking performance, competition, and alternative banking systems. While some references or discussions include disruptive technology, the focus of these studies is not on Fintech or related technologies. In general, studies agree that new technologies should be integrated into the banking system to improve performance, efficiency, and stability (Buallay et al. 2019). Several articles emphasise the role of regulation, arguing that current regulations are ineffective in accelerating the adoption of new technologies (Rupeika-Apoga and Thalassinos 2020; Kaur et al. 2021).

The studies identified with the theme “Lending” cover a wide range of lending-related topics, such as peer-to-peer lending, crowdfunding, supply chain financing, mobile platforms, and regulatory concerns. Generally, the articles note how big data analytics enables the reduction of search and signalling costs in credit risk management (Sanka and Cheung 2021). Ultimately, innovative lending solutions such as online P2P lending platforms reduce information asymmetry. This may result in greater efficiency compared to commercial banks (Moises Arantes et al. 2018; Sutherland 2018). This is supported by the growth in the volume of electronic money in emerging economies (Moises Arantes et al. 2018). The reviewed articles acknowledge that crowdfunding and crowd-lending may substantially threaten traditional bank financing due to greater convenience, simplicity, and flexibility (Katalkina and Saksonova 2022). While crowdfunding has been growing rapidly, scholars are sceptical regarding the sustainability of the crowdfunding model (Langley and Leyshon 2017).

#### 4.5. Additional Issues

Several studies were associated with the sub-theme “Cybersecurity, fraud, and legal issues.” While many articles included in the review have examined regulatory and security issues, studies under this theme specifically focus on regulations, regulatory technology, liability, and cybersecurity. These studies acknowledge that the benefits of Fintech and increased access to financing are associated with an increased need for contracting parties’ legal protection (Esoimeme 2020; Siciliani 2020). Scholars generally agree that Fintech introduces new vulnerabilities through which internal and external fraudsters can access bank payment information, payment links, and cryptocurrency details (Sureshbhai et al. 2020). It has been argued that some of these vulnerabilities may be addressed by new technologies such as blockchain and biometrics (Chou 2021). Simultaneously, there is no consensus regarding the preferred fraud liability regime in the literature review, particularly regarding front-end Fintech payment services and back-end integrated payment services provided by banks and credit card companies (Yoon and Lim 2020). Overall, there appears to be little to no research on financial fraud cases.

The “Customers and consumer decision-making” sub-theme investigates how innovative technology influences consumer experiences and decisions in the financial sector. Overall, Fintech companies may be able to better distinguish consumer preferences stemming from self-efficacy, perceived user-friendliness, enjoyment, satisfaction, and trustworthiness (Rupeika-Apoga and Wendt 2021). The reviewed studies support that Fintech’s use of non-credit information, such as Internet behaviour, may allow Fintech firms to provide credit to underprivileged consumer groups (Jibril et al. 2020; Wu et al. 2020). There are also differences in advertising methods and impacts of Fintech brands compared to established banks (Tien et al. 2018).

The “Machine learning” sub-theme includes studies that describe specific machine learning and artificial intelligence solutions for the financial sector. Despite the low number of studies under this theme, the articles cover a wide range of applications, from Bitcoin price forecasting and blockchain benchmarking to credit scoring and credit card user segmentation. A few studies focus on improving the performance of relevant technologies such as blockchain (Kim et al. 2019; Zhu et al. 2020). Similar to previous themes, regulation appears to be a major concern in the adoption of machine learning and AI in the financial sector. It is possible that a lack of proper regulation would translate to substantial economic loss, which would lead to over-regulation as a backlash (Truby et al. 2020). The studies appear to agree that it is preferable to adopt a proactive approach with regard to regulation to achieve a balance between financial stability and technological development. A related issue is a possible bias in automated decision-making regarding discrimination based on gender or race (Lui and Lamb 2018).

Finally, a few studies have been classified under the “Financial inclusion” sub-theme. While many studies mentioned the socioeconomic benefits of ease of access to credit due to technological development, only a few articles focused on the problem of financial inclusion. In general, the studies under this theme support that innovative technology-based solutions have the potential to reduce barriers to financing for underprivileged population groups. Inclusive financial systems help foster economic growth and contribute to economic development (Bongomin et al. 2019). While Fintech can improve access to financial services, its effectiveness may be hindered by institutional, socioeconomic, and cultural factors. In particular, possible economic empowerment effects may be offset by poor adoption, low Internet connectivity, and a stringent regulatory environment (Biggs 2016). The substitution effect of Fintech-enabled financial inclusion, with respect to traditional banking, may also depend on bank concentration (Feyen et al. 2021).

## 5. Discussion and Conclusions

Emerging technologies have changed the way we communicate, buy, and do business over the last few decades. Emerging technologies have consistently disrupted how consumers interact with their money, what they expect from banks, and how banks operate.

Modern processes are simplified and made more effective, error rates are decreased, communication is improved, and consumer perceptions of and interactions with money are altered. At the same time, Fintech disruption is a deviation from the norm, resulting in a significant shift in banking services and, as a result, risk.

The number of studies available confirms academics' growing interest. We focused mostly on the individual, primary, empirical studies devoted to Fintech, banks, and blockchain topics. Such studies provide direct access to evidence-based findings. When taken in large numbers, however, they become an overwhelming pile of individual bits of information lacking order and coherence. We moved from analysis to synthesis by bringing together and breaking down findings, examining them, discovering essential features, and combining phenomena into a transformed whole by using thematic analysis. We go over two aspects of our findings in depth: the implications of Fintech and blockchain technology.

### *5.1. Emphasis on the Implication*

Fintech is the result of financial innovation development, which is supported by financial engineering. Financial innovation is driven by changes in customer demand, regulation, and, of course, emerging technologies (i.e., both the supply and demand push). The primary goal of financial innovation, both for Fintech companies and traditional financial intermediaries and financial markets, is to reduce costs by being more efficient and effective and gaining a competitive advantage. The provision of new services or the updating of existing ones is, therefore, a constant activity for all financial participants. These activities are associated with various risks, such as regulatory, strategic, and operational risks, as well as environmental risks.

The review suggests that banks are aware of the strategic objectives of Fintech, which may help achieve improved customer convenience and a greater market reach (Langley and Leyshon 2021; Fakhar Manesh et al. 2021). For example, Polasik and Piotrowski (2016) showed that Polish banks were extremely interested in implementing several payment innovations simultaneously. However, the benefits of enhanced financial inclusion may be offset by an increase in systemic risk and protection of consumer interests (Kaur et al. 2021). A substantial number of studies have focused on the security and efficiency of new technologies. This may reflect the key concerns of established businesses when considering the adoption of innovative solutions. For example, Subramanian et al. (2019) considered a method of rebalancing link weights in acyclic payment networks to minimise computational costs. This demonstrates that incumbent banks are eager to embrace Fintech, but there is still considerable uncertainty about how to do so more effectively. Banks can create their own products or use third-party services by outsourcing.

Collaboration between banks and Fintech appears to be a major theme of the reviewed articles. Zalan and Toufaily (2017) reported that, in the context of adapting to global digitalisation, the preferred strategy of incumbent banks in the Middle East and North Africa (MENA) is to collaborate with Fintech institutions. Therefore, banks appear to have shifted from traditional debt-financing activities to equity investments in Fintech (Hommel and Bican 2020). Fung et al. (2020) examined a panel of 84 countries and found that promoting Fintech improves the financial stability of banks in emerging financial markets while having the opposite effect in developed markets. Li et al. (2017) used the relationship between banks' stock returns and Fintech funding as indirect evidence of the complementarity between them.

Moreover, evidence suggests that disruption has a negative impact on banks' performance (Phan et al. 2020). Notably, Chen and Peng (2019) found that overinvesting in financial innovation worsens performance. Therefore, there appears to be no consensus in the literature regarding the effect of Fintech on incumbent banks. Particularly, the evidence on the relationship between Fintech-induced financial inclusion and actual development is mixed (Demirgüç-Kunt et al. 2020). These contradictions can be explained by the evolving nature of emerging technology. Soloviev (2018a, 2018b), for example, contends that Fintech initiatives have not yet resulted in a radical transformation of the financial sector because

the financial ecosystem lacks consensus on the nature of Fintech. Furthermore, a wide range of financial innovations have emerged in recent years, and not all of them are disruptive. In addition, the fact that disruption can take time explains why incumbents frequently overlook disrupters.

Fintech disruption forces banks to respond by transforming (Kaur et al. 2021). The reviewed articles agree that multi-party collaboration and cooperation are preferred in transformation (Bongomin et al. 2019). This seems consistent with the observed response, as banks have shifted from outsourcing for cost reduction to outsourcing for innovation (Hadad and Bratianu 2019). While the findings of several articles highlight the role of financial cooperation as a method of adapting to the new environment, few studies have explored cooperation in the banking industry.

Similarly, Ramdani et al. (2020) found that innovation in the U.K. banking sector aims to improve established retail banking activities. The larger commercial banks seem to have taken a more active role in the Fintech disruption by partnering with or acquiring Fintech firms (McKillop et al. 2020). However, the adoption of new technology may be slowed down by behavioural factors (Darmansyah et al. 2021).

Regulators mandating information disclosure, registration, and lending limits may help promote collaboration between incumbent banks and online lending platforms (Rupeika-Apoga and Wendt 2021). However, longer intermediation chains might be antithetical to the socioeconomic purposes of P2P lending. This poses a regulatory problem, and the increased systemic risk has to be controlled to allow for alternative channels of financial intermediation (Bavoso 2020). Moreover, a “wait-and-see” or laissez-faire approach has also been criticised because it fails to account for increased stability risks and regulatory arbitrage (Tanda and Schena 2019). While this approach appears to be unsustainable in the long run, it can be used to foster financial development and inclusion in emerging markets. As a complementary measure to address the increased risks of new technology, it may be beneficial to encourage greater corporate social responsibility (CSR) in financial institutions (Costa-Climent and Martínez-Climent 2018). Greater transparency and social awareness could foster a fair and sustainable lending environment that accounts for the socioeconomic aspirations of individual consumers. However, this can be challenging to achieve, especially in emerging markets with historically stringent banking controls (Thompson 2019).

According to the disruptive innovation theory, when an entrant confronts incumbent competitors head-on with better products or services, the incumbents will accelerate their innovation to defend their business (Christensen et al. 2015). However, our findings suggest that the disruptive innovation theory is not fully applicable to the development of financial markets because incumbents are interested in collaboration.

### 5.2. Emphasis on Blockchain Technology

Blockchain is an emerging technology that is widely regarded as one of today’s most promising opportunities for banks and other financial institutions (KPMG 2019; Grima et al. 2021). For instance, Accenture estimates that by moving to clear and settling operations to the blockchain, investment banks could save USD 10 billion (Accenture 2022).

According to analysis, implementing blockchain systems requires consideration of factors such as traceability, accessibility, and efficiency (Shoaib et al. 2020). Ko et al. (2018) argued that there is a gap between the increasing popularity of blockchain systems and the extent of monitoring blockchain transactions. This highlights the inherent conflict between the decentralisation of Fintech and the need to ensure that blockchains operate legally and reliably. Benefits of adopting blockchain by banks include reducing friction and delays and boosting operational efficiency in all areas of the market, including international trade, trade finance, clearing and settlement, consumer banking, lending, and other transactions (Katalkina and Saksonova 2022; KPMG 2019; Grima et al. 2021).

While many studies highlight the advantages of blockchain, the shortcomings of this technology have also been discussed. The first requirement for blockchain-based

applications is that the system should be used by everyone involved in the process ecosystem. As a result, everyone will need to invest in the technology upgrades and procedure modifications that come along with switching to the new blockchain-based application. Additionally, studies point out that many businesses do not think blockchain can currently generate high enough returns to justify the expense of replacing current systems (Sanka and Cheung 2021). Many blockchain-based solutions also require assistance from other systems and procedures to confirm the accuracy of the data being added to the blockchain. For example, IoT devices often cannot store the full blockchain, which may lead to performance bottlenecks and increased costs (Sanka and Cheung 2021). Liu et al. (2017) highlighted the role of providing educational environments that teach basic blockchain concepts such as transactions, hashes, and blocks. However, complex organisational contexts might make it infeasible to implement blockchain systems (Rijanto 2021).

Blockchain is not yet widely available despite being one of the most popular emerging technologies in the banking industry (Rijanto 2021). It may take 10 to 20 years to fully embrace the power of blockchain technologies. Many banks are implementing blockchain solutions independently, including checking, money processing, trade finance, etc., although some organisations are developing more comprehensive ones. Smaller financial institutions that lack the resources to create a solution may find this to be a significant barrier. However, given the recent rapid uptake of blockchain, it will soon overtake other common solutions for things such as payments, fraud prevention, loan processing, smart contracts, and more.

Academics are particularly interested in the application of blockchain technology, which enables the existence of cryptocurrency. The majority of studies that focus on a specific cryptocurrency examine Bitcoin. Other cryptocurrencies, such as Ethereum and stablecoins, may require more research. This suggests a gap in the existing literature. In particular, the Ethereum cryptocurrency enables “smart contracts,” which are protocols that self-enforce when certain conditions are triggered (Bhat and Vijayal 2017). In line with the general literature on Fintech, the studies on blockchain-based cryptocurrencies have highlighted the potential of new technology to reach financially underprivileged population groups. It may be challenging for digital marketing to penetrate rural regions with poor network connectivity, while alternatives such as micro-banking have security flaws (Hu et al. 2020). The global nature of cryptocurrencies allows for potentially more secure and lower-cost transfers accessible to individuals in remote regions through smartphones (Barrutia et al. 2019).

This study revealed that the potential of blockchain applications is not limited to financial institutions and payment systems and that there is growing interest in blockchain technology. Blockchain technology is neither good nor bad; it has both positive and negative aspects, much like a coin with two faces. Thus far, numerous mainstream industries have reaped the benefits of such a reliable and robust technology. As a result, despite its flaws, technology is used. Blockchain-based applications should benefit from being combined with artificial intelligence, machine learning, or another decision-making layer.

### 5.3. Concluding Remarks

After summarising all of the findings, the following conclusions can be made:

(1) Incumbent banks are interested in collaborating with FinTech firms to reduce costs, improve systemic financial stability, and mitigate the negative externalities of disruption and competition. Special consideration is given to technology and operational risks, as well as strategic risks, among the various types of business risks. Both established banks and Fintechs are enthusiastic about working together to manage cybersecurity risk. The financial sector believes that integrating emerging technologies into strategic risk management can improve business performance. As a result, because incumbents are interested in collaboration, the disruptive innovation theory is not fully applicable to the development of financial markets. This finding is useful for both incumbent and newcomer managers in terms of business risk management.

(2) Another critical issue is regulatory risk. The main issue raised in various papers (Rupeika-Apoga and Wendt 2022; Siciliani 2020) is that many countries supervise and monitor the FinTech industry using an activity-based approach, whereas banks are subject to entity-based regulation. Regulation should allow for variations in the regulatory treatment of a specific activity if the corresponding risks differ depending on who performs the activities (“same activity, different risks, different regulation”). Regulation has lagged behind the growth of the Fintech industry, but it is only a matter of time before all activities are monitored. Furthermore, in developing regulatory frameworks, regulators should promote stability and resilience while incorporating financial inclusion goals and the broader socioeconomic benefits of new technologies.

(3) Outside of finance, blockchain technology can be used in applications including healthcare, insurance, voting, welfare benefits, gambling, and artist royalties. This demonstrates that the potential of blockchain applications extends beyond financial institutions and payment systems, and it is accompanied by a surge in interest in blockchain technology.

This study also has several limitations. First, the analysis attempted to provide a comprehensive overview of the existing literature. As a result, the coverage of more specific topics, such as implementation issues of blockchain protocols, integration of legacy architectures, and market-level differences in regulation, is less detailed. Second, the identified themes vary greatly in scope. While this allows for a more feasible analysis reflecting the major directions of recent research, it may be less useful in identifying research gaps regarding specific technologies such as smart contracts or open banking. Lastly, the study excluded conference papers, editorials, and short surveys, which might have provided relevant information about the gap between academic research and practice.

Future studies may expand on the present paper by addressing its limitations and exploring the key subthemes in greater detail. There is a relative lack of studies on financial inclusion and mixed evidence on the effects of Fintech on development. This suggests that researchers should consider how emerging technologies are linked to specific socioeconomic outcomes. Future studies may also explore whether Fintech alleviated the economic shock of the COVID-19 pandemic on SMEs and underprivileged households. It may also be valuable if researchers investigated the relationship between the degree of regulatory control and the effectiveness of Fintech disruption.

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